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MEDICAL SOCIETY
OF LONDON

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JAMES DRAKE
M. D.

LONDON. MEDICAL SOCIETY
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Anthropologia Nova;

OR, A

NEW SYSTEM OF ANATOMY.

Deſcribing the
ANIMAL OECONOMY,
AND A
Short RATIONALE
Of many
DISTEMPERS
INCIDENT TO
Human Bodies.

In which are inſerted divers *Anatomical Diſcoveries*, and *Medicinal Obſervations*, with the Hiſtory of the Parts.

Illuſtrated with above Fourſcore Figures, drawn after the *Life*: And to every Chapter a SYLLABUS of the Parts deſcrib'd, for the Inſtruction of Young *Anatomiſts*.

By *JAMES DRAKE*, M. D.
Fellow of the *College of Phyſicians*, and of the *Royal Society*.

VOL. I.

London, Printed for SAM. SMITH and BENJ. WALFORD
at the *Prince's-Arms* in St. *Paul's* Church-Yard. 1707.

L*Ibrum hunc, cui Titulus,* Anthropologia Nova; *or,* A New Syſtem of Anatomy, *&c. dignum cenſemus qui Typis mandetur.*

Datum ex Ædibus noſtris Comitiis Cenſoriis, *Apr.* 4. 1707.

Edvardus Browne, Præſes.

Gualt. Charleton
Carolus Goodall
Johan. Bateman
Tho. Gill
} Cenſores.

To His GRACE,

HENRY
Duke of *Beaufort.*

May it Pleaſe your Grace,

IF the Author of this Book had liv'd to Enjoy the Honour Your GRACE *allow'd him, of Inſcribing of it to ſo Great a Name, He would have done that Juſtice to Your*

GRACE'S *Character, which cannot be expected from a Retir'd Diſconſolate Woman; whoſe great Misfortune it is, that it was not offer'd to Your* GRACE *by a better* Hand. *But all that he could have ſaid of Your* GRACE'S *Princely Family, Steady Principles, and Unbounded Generoſity, is no more than the World already knows and acknowledges. The Aim of his Ambition, in Addreſſing to Your* GRACE, *was, to Recommend this Work to that Fa-*

Favour Your GRACE *had ſhown to ſome of his Performances in another way: And this, to my unſpeakable Grief, I can do more effectually than he could have done himſelf. For 'tis now an Orphan that I am pleading for to Your* GRACE; *and as nothing Engages a truly Noble Mind, like an Object of Compaſſion, ſo the Diſtreſſed have always the ſureſt Title to Your* GRACE'S *Protection: And this I hope will excuſe me (no otherwiſe known to Your* GRACE *than*

than by my Calamities) for preſuming to lay this Offering at Your GRACE'S *Feet, and Subſcribing my ſelf,*

May it Pleaſe Your GRACE,

Your GRACE'S

Moſt Obedient and

Moſt Humble Servant,

Judith Drake.

PREFACE.

IT has been cuſtomary for Authors (even of the Higheſt Reputation, and the moſt conſcious of their own Worth and Abilities) to offer ſomething to their Readers, in Juſtification, or by way of Apology at leaſt, for their Undertakings; to take off the Imputation of preſuming to be Wiſer than the reſt of the World; to, and for whom they wrote! What was decent Modeſty in ſuch Men, is perhaps Neceſſity in me; the Meanneſs of whoſe Performance may ſeem to call loudly for an Apology. But, if an Excuſe may at any time be receiv'd for the Imperfection of Works thus offer'd to the Publick, that Favour may juſtly be indulg'd to me, upon the ſcore of the extraordinary Interruptions I met with in the Proſecution of this Work; the Nature and Story of many of which, are but too well known to need to be reviv'd here, and the reſt not worth troubling the Publick with.

It is generally objected, That Authors are *Volunteers*; and therefore ſhould be very ſure of acquitting themſelves Honourably, or not enter the Service; which muſt render them inexcuſable upon any other Terms. But if *Philanthropy*, and a deſire of contributing ſomething to the Common Benefit of Mankind, be not an Excuſe for moderate Failings in Laudable Deſigns (*in quibus voluiſſe ſat eſt*) there's an end of the *Commonwealth of Letters*; and none but Coxcombs will put Pen to Paper for the Preſs. Senſe and Modeſty generally go together: But no Man that has either, will preſume ſo far upon his own Sufficience, or make ſuch an Oſtentatious Declaration of his Vanity and Self-Conceit, as becoming an Author, upon thoſe hard Terms, would amount to.

Tho' I have a very great Affection for Mankind in general, and more particularly for my own Country, and as much Ambition to ſhew it, becauſe I think it a Laudable Ambition; yet I ſhall not defend the Imperfections of this Work that way, leſt I ſhould be taken to think my ſelf a more Neceſſary Perſon, and my own Performance more Valuable, than I really do.

But as I think the True Reaſon always the Beſt, eſpecially when 'tis an Honeſt one, I ſhall make no Scruple to tell it plainly. I had a little before thoſe Vexatious Interruptions, which I have ſince met with, came upon me, engag'd to the *Bookſellers* who Print this, to draw up a ſhort Syſtem upon the Figures of *Blancard*, which they, without my Advice had purchas'd, in expectation of having that done by the late Ingenious Dr. *Havers*, (according to a Contract they had made with him) which now is fall'n to my Share; which Figures were procur'd at his Inſtance, and make the *Appendix* to this Work.

The Execution of this Deſign was retarded by ſome Troubleſome Affairs of my own, much longer than I could have ſuſpected: And therefore to make them ſome amends for the Delay; tho' I could not ſit down earneſtly to the Work, I did, at ſuch Intervals as I had, conſider how to improve the Deſign; in which, I hope, I have not been altogether Unſucceſsful. However, I was diverted by ſuch Avocations, that had it not been for the Aſſiſtance of my Learned and Ingenious Friends, Dr. *Branthwait* and Mr. *Cowper*, I know not whether I ſhould have had Courage or Patience to have gone thro' with it.

The great Skill and Experience of Mr. *Cowper* in *Anatomical* Affairs, had made it an Injury to my ſelf and this Work, not to have made the beſt Uſe of the Benefit of his Friendſhip. For beſides the ſeveral *Plates* with which the Body of this Work is adorned (which are all, except Four, owing to him) it is likewiſe embelliſh'd with divers Curious Speculations, and Uſeful Obſervations; beſides ſome whole

Chapters, either written by him, for this very purpoſe, or extracted from ſome of his former Writings; ſuch as the Chapters of the *Penis*, and of the *Noſe*: To all which I have generally taken care to entitle him by Name.

To this Gentleman's great Converſation in Human Subjects, it is that I owe the rectifying many Errors, not to be adjuſted by *Anatomical* Books; amongſt which are innumerable Differences not to be decided but by *Autopſy*; which, in the Scarcity of Human Subjects amongſt us, would have requir'd Years for Deciſion, had it not been for the Numerous Collection of PREPARATIONS and DRAWINGS, which Mr. *Cowper* keeps by him; the latter being all done by himſelf from the Life.

The other Gentleman whom I have mention'd, is ſo well recommended to all that know him by his Learning and Ingenuity, that he needs no Character from me; and therefore I mention him only by way of Acknowledgment, for that Kind Aſſiſtance that he afforded me, without which, this Work muſt have gone but ſlowly forward, as I was then embaraſs'd. This Gentleman was ſo kind as to aſſiſt me, not only in Collating the many *Anatomical Authors* which I was, on this Occaſion, bound to conſult, and to furniſh me with many Judicious Reflections thereupon, but to relieve me with his own Hand, from the fatigue of Writing; at which I own my ſelf not to be very ready; nor under it very eaſie; and therefore I think my ſelf happy in a Friend, who could not only aſſiſt me with his Judgment, but his Hand likewiſe, in which moſt of this Work was written.

Thus far went the Learned and Ingenious Author: And whatever he would have thought fit to add, if the Almighty had prolong'd his Life, we may certainly conclude would have been very Inſtructive, and proper to illuſtrate this Work, which now comes forth without that Advantage.

What was known of his Intentions, is only that he deſign'd a pretty large Diſcourſe on the Uſefulneſs of the Study of *Anatomy*, to the Practice both of *Phyſick* and *Surgery*; and of what Neceſſity the Knowledge of it is, to accompliſh a Man either in the one, or the other; which indeed, one would think a Truth too evident to be deny'd: And that at this time, there ſhould be any ſort of Men, who endeavour to repreſent *Anatomical Enquiries*, as Trifling Curioſities only to amuſe Mankind, is really wonderful; but the little Credit they obtain from Men of Senſe, is a juſt Excuſe from making any other Reflection upon them, than barely mentioning them.

If the Art of *Curing Diſeaſes* has not met with proportionable Advances ſince *Galen*, the true Reaſon was the want of Skill in *Anatomy*: This is a Truth which ſucceeding Ages muſt confirm, if thoſe who have proper Heads and Hands would contribute their Endeavours.

It is certain, as much improv'd as *Anatomy* has been theſe latter Years, there ſtill remains a vaſt Field to Cultivate Uſeful Diſcoveries in; even ſuch as will ſerve, not only to explain ſome *Phænomena* of Diſeaſes, but to point out to us their Seats and Methods of Cure. An unconteſtable Proof of this may be ſeen in *Book* III. *Chap.* 10. of this *Syſtem of Anatomy*, in the Cure of an *Ozæna*; as well as in many Uſeful Diſcoveries and Obſervations in Practice, diſperſed up and down in this Work.

The Method of Treating the Parts us'd by the Learned Author is ſuch, as appear'd to him to be the moſt Natural; and will doubtleſs be found ſo. However, to prevent the Difficulty that may attend thoſe who have been only Converſant in the Common Methods of other Books of this kind; Care is here taken, to fix the Title of the Contents to the Top of each Page, that it may be readily turn'd to.

Under the Title of each Chapter he has plac'd a Conciſe *Syllabus*, of the Latin Proper Names of the Parts; which, at one

View, gives an exact Scheme of the Particulars that are the Subject of the enſuing Chapter, and the Method in which they are treated of.

The Figures in the *Appendix* (annex'd to the firſt Volume) were of the firſt Edition of Dr. *Stephen Blancard*'s *Anatomia Reformata*, and are Borrow'd from other Books of *Anatomy*; from which, and *Autopſy*, the Explications here annex'd are written; and not from that Collector's Account of them; which is full of Groſs Miſtakes, tho' he did no more than Tranſcribe the Explications of their Original Authors.

How Clearly and Truly our Author has reaſon'd upon the Natural Functions, muſt be left to every *Reader*'s Judgment: But if in ſolving a great many *Phænomena*, he has made uſe of a different *Hypotheſis* from other Learned Men, it was, becauſe, upon the beſt Grounds of Obſervation and Reflection, he thought it to be true, and that he was able to defend it.

It were to be wiſh'd, That as he has gratefully done Juſtice to his two Friends, who facilitated his Performance of this Work; ſome one of the Multitude of his Learned Acquaintance would do Juſtice to his Memory, in giving the World a true Character of him.

How thoroughly he underſtood the Fabrick and Conſtitution of *Humane Bodies*, this *Syſtem of Anatomy* is a Convincing Teſtimony: And his Notions about the Diſeaſes incident to them, were not leſs Clear and Comprehenſive. This would have been abundantly made out, and probably the Caſe of Phyſick have been more truly Stated, if he had liv'd to finiſh ſeveral *Treatiſes* he deſign'd for the *Preſs*; of which he left behind him many Materials, and intended, when he had Leiſure and Calmneſs of Thought, to put together.

A Treatiſe de Morbis Congeneribus, &c.

But as he had Read much, and Study'd hard; ſo he knew how to make them applicable and ſubſervient to his Profeſſion. A bare *Hypotheſis*, he knew would go but a little way towards the Cure of Diſeaſes; and therefore he never depended upon any, how ſpecious ſoever, that were not grounded upon Obſervations and Experience; which was the true way he took to be a *Succeſsful* as well as a *Learned Phyſician*.

He was ſo very well acquainted with the *Materia Medica*, and had ſo well weigh'd the Qualities and Virtues of particular Simples, that he generally approv'd, and made uſe of the ſhorteſt Preſcriptions as the beſt: And this he did for many good Reaſons, as well as out of Conſcience to his Patients; and a deſire of taking the ſhorteſt and eaſieſt way of doing Good to Mankind. 'Tis true, this was not very obliging to a certain Community of Men, who ſeldom fail, when they have Power, to ſhew their Reſentments.

Nor was our Author only Learned in his own Profeſſion, but he truly deſerv'd the Character of an *Univerſal Scholar*. He was thoroughly acquainted with the *Claſſical Authors*, both *Greek* and *Latin*, whether *Hiſtorians*, *Orators* or *Poets*; whom he knew how to imitate in all their Strength and Beauty. He had made a conſiderable Progreſs in all the *Liberal Sciences*, and could inſtructively entertain ſuch as were the Profeſſors of any one of them. His Style, both *Latin* and *Engliſh*, was Manly yet Eaſie; Conciſe, yet Clear and Expreſſive: And even thoſe who ſometimes diſapprov'd the Subject of his Writings, could not but applaud the Politeneſs of his Compoſures; for he had arriv'd to that difficult Perfection, of knowing how to make uſe of his Learning without Pedantry or Oſtentation.

Neither was his Knowledge confin'd only to *Books*, for he had Read and Study'd *Men* with the ſame Care and Exactneſs. He was very well acquainted with the State and Circumſtances of the World; and by his great Knowledge in Ancient and Modern Hiſtories, and his own Obſervations, had made himſelf a Judge of Political, as well as Natural Conſtitutions.

His Friendſhip was not ſufficiently to be valu'd, becauſe it was diſ-intereſted and ſincere; and whoever he made a Profeſſion of it to, had a Right to all the Good Offices that were in his Power: And indeed he was acted by ſuch an extenſive Benignity and Good-nature, that he took Pleaſure in ſerving all Men without Diſtinction of Parties, or hopes of Retribution.

He was Steady to his Principles, becauſe they were the Reſult of his Judgment, after a ſtrict and mature Examination; and this made him uncapable of thoſe little Changes, which Times and Occaſions ſubject moſt Men to, for want of ſuch a firmneſs and preſence of Mind, as not only the Study of *Humane Nature*, but of the *Moral Science*, had endow'd him with.

Some perhaps may think, that this Author's *Pencil* was a little too bold in the *Deſign* and *Colouring*: but viewing the preſent Age in a true *Perſpective*, it might be difficult for an honeſt Man not to write *Satyr*. It was thought no Crime even in the Age of *Auguſtus*, to ſpeak and write freely: Indeed ſome of the ſucceeding *Emperors* made it ſo, though not all; And the preſent *Reign* of a moſt *Glorious*, *Conquering*, *Vertuous* QUEEN, may be indulgent in ſuch Liberties, as cannot move the mighty Fabrick.

To conclude, He was too good a Philoſopher to look no further than *Natural Cauſes*; and his Skill in *Phyſiology* was ſo far from leading him into *Scepticiſm* and Infidelity, that it gave him an Awful Senſe of Religion. How hearty a Lover he was of the *Eſtabliſhed Church*, of which he was a *Member*, will be acknowledg'd by all thoſe that knew how ready and indefatigable he was, at all times, to vindicate and ſerve it.

ERRATA.

VOL. I. p. 12. in the Margin, for *Anquity*, r. *Antiquity*. *P.* 40. l. 2. for *Slytoide*, r. *Styloide*. In the Appendix, p. 78. l. 4. for *Circularis*, r. *Cucullaris*.

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——— *Ejuſdem cum multis Additionibus ab Authore, Latine reddidit Samuel Clark, A. M.* 4to. 1706.

Jo. Raii Hiſtoria Plantarum Species, hactenus editas aliaſq; inſuper multas noviter inventas & deſcriptas complectens, Tomi Duo. Fol.

——— *Ejuſdem Tom. Tertius, qui eſt Supplementum duorum præcedentium, cum acceſſionibus Camelli & Tournefortii, Fol.* 1704.

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Gualt. Harris, M. D. de Morbis Acutis Infantum, Editio ſecunda auctior; annexis etiam quibuſdam de Luis Venereæ origine, natura & curatione, 8vo. 1705.

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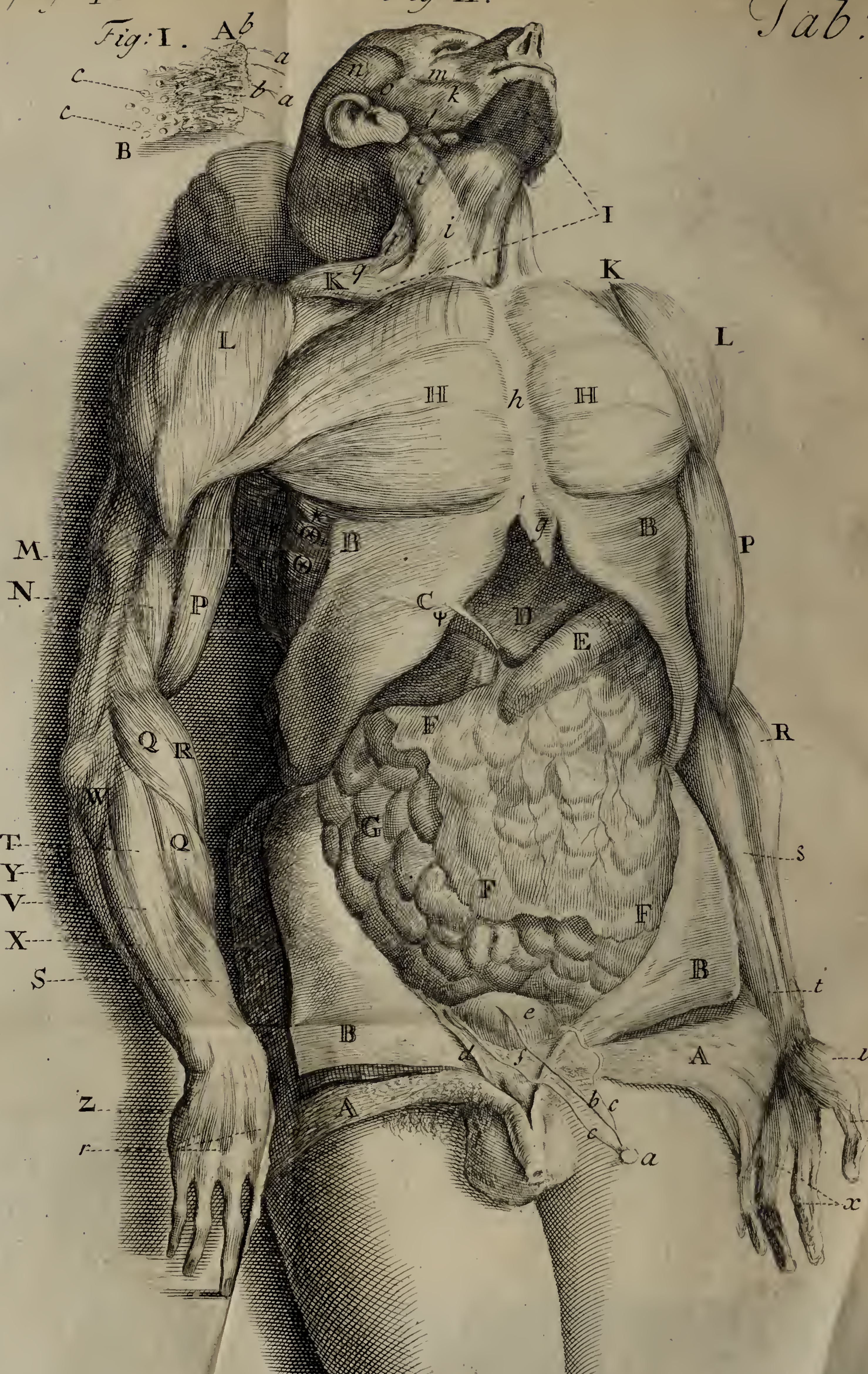

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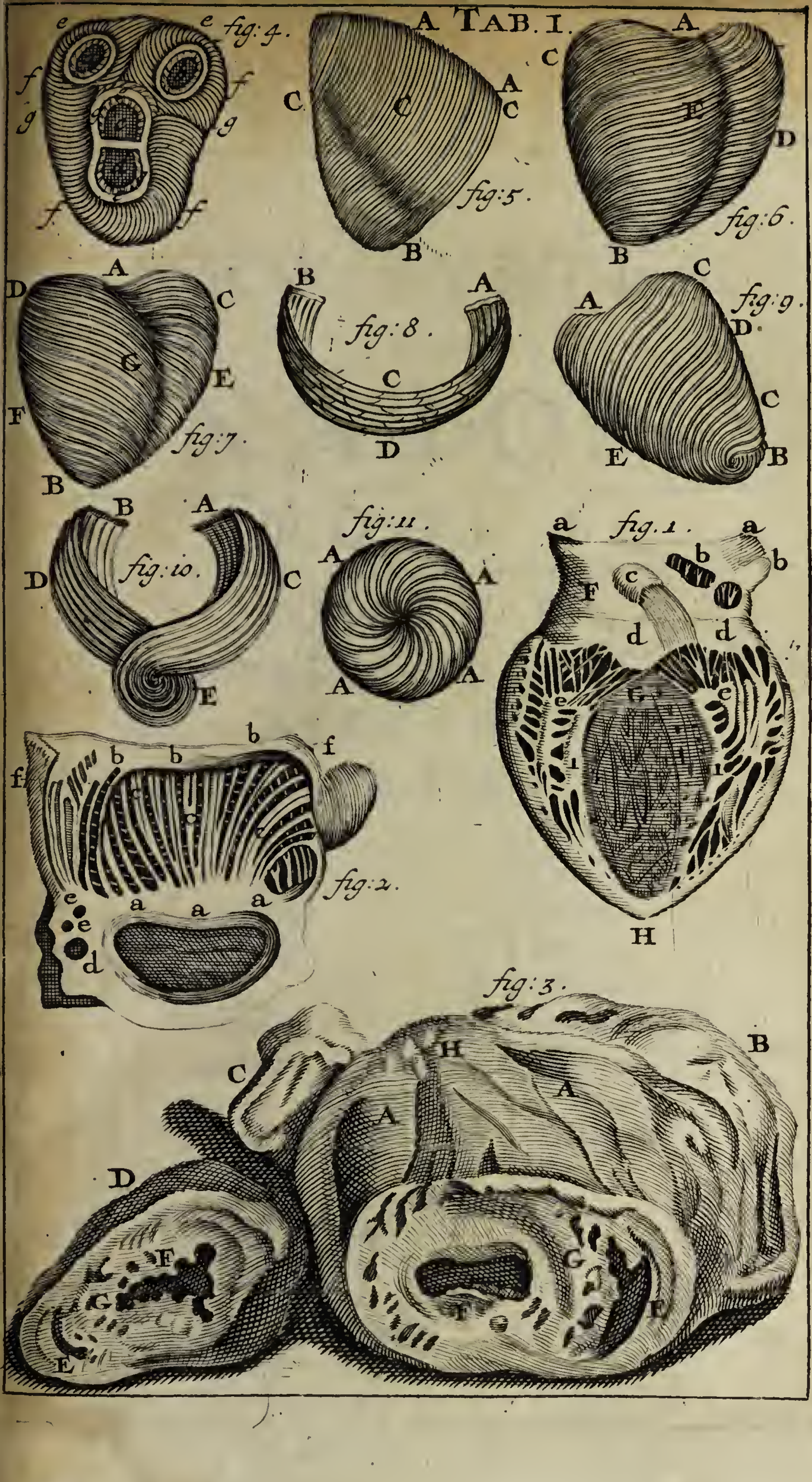
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A NEW SYSTEM OF ANATOMY.

BOOK I.

CHAP. I.

Of the General Conſtituent Parts of the Body.

SYLLABUS.

Partium Corporis Humani Generalium.

Partes Generales ſunt vel Solidæ & Continentes
- *Oſſa*
- *Cartilagines*
- *Ligamenta*
- *Membranæ*
- *Fibræ*
- *Muſculi*
- *Tendines*
- *Arteriæ*
- *Venæ*
- *Nervi*
- *Glandulæ*
- *Lymphæductus*
- *Venæ Lacteæ*
- *Ductus Excretorii*

Vel Fluidæ & Contentæ
- *Chylus*
- *Lac*
- *Serum*
- *Sanguis*
- *Adeps*
- *Spiritus*
- *Lympha*
- *Mucus*
  - *Narium*
  - *Articulorum*
  - *Urethræ*
- *Saliva*
- *Bilis*
- *Succus Pancreatis*
- *Semen*
- *Medulla Oſſium*
- *Cerumen Aurium.*

A*NATOMY* is the Art of *Diſſecting*, or artificially taking to pieces the ſolid Parts of *Animal Bodies*, in order to an exact diſcovery of their Structure.

Anatomy what.

Speculative and Practical.

It is often divided into *Speculative* and *Practical*, a Diviſion which I think not very momentous, and therefore ſhall not inſiſt upon.

Its Subject.

The Subject of it is a *Humane Body*: And tho' *Brutes* and *other Animals*, and ſometimes *Vegetables*, fall under its Conſideration, it is only (with *Phyſicians* at leaſt) in order to illuſtrate the former; and is called *Comparative Anatomy*.

Comparative Anatomy.

Vulgar Diviſions of the Body.

Anatomiſts have uſually divided the *Body* into Parts *Organical* and *Inorganical*, *Similar* and *Diſſimilar*, *Spermatick*, &c. but to what uſe, or with how much Inſtruction, is not very apparent to me, who am apt to think ſuch Diſtinctions only burthenſom to the Memory, and not very edifying.

Uſeleſs.

Neceſſary Diviſion.

However, there is a Diviſion, which is not to be neglected, which is into ſuch Parts, as will have frequent occaſion to be mention'd in the following Diſcourſes, that are capable of a General Definition, which would not be proper ſo often as the mention of them will particularly recur. It will however be abſolutely neceſſary for the benefit of Learners (for whoſe ſake ſuch Treatiſes as this are written) that a General Idea be given of them, before they come to read of them ſeparately.

Enumeration of the Solid Parts

The whole Body conſiſts of *Bones*, *Cartilages*, *Ligaments*, *Membranes*, *Fibres*, *Muſcles*, *Tendons*, *Arteries*, *Veins*, *Nerves*, *Glands*, *Lymphæducts*, *Lacteals*, and ſome other peculiar *Ducts*, which will be beſt known by their Deſcriptions in their proper places.

Fluids or Humours. Beſides theſe which are the *Solid* and *Continent Parts*, there are contain'd in them divers *Fluids*, ſuch as the *Chyle*, *Blood*, *Milk*, *Fat*, *Serum*, *Lymph*, *Spirits*, *Bile*, *Salival*, *Pancreatick Juice*, *Seed*, &c.

Bone defin'd. A BONE *is the hardeſt part of the Body, and the Prop and Support of all the reſt, for which end it is fram'd. Its Subſtance is white, fragil, not diſtendible, (but in morbid caſes) and void of Senſation.* The *Bones* are all cover'd with a peculiar Membrane call'd the *Perioſteum*, which is extremely ſenſible, and many of them are hollow, and fill'd with an oily fat Subſtance, which is called the *Marrow*. *Perioſteum.* *Marrow.*

Cartilage. At their ends they are uſually capp'd with *a white, ſmooth Subſtance, ſomewhat ſofter than themſelves, upon which they move and turn*, and which is called a CARTILAGE; which in length of time often grows boney, as it is generally found in old People.

Ligament. To the *Bones* are always annex'd LIGAMENTS, which are a *tough*, *flexile*, *ſmooth Subſtance*, *ſerving to tye them together*, and ſometimes reſembling a *Tendinous* or *Nervous*, ſometimes a *Membranous*, and ſometimes *Cartilaginous* Subſtance, into which, in ſome Diſeaſes, they often degenerate.

Membrane A MEMBRANE is a *thin, white, or tranſparent, flexile, expanded Subſtance. ſerving to cover and cloath the other Parts, which is the proper and peculiar uſe of it:* When it is the covering of a *Veſſel*, it is called a *Coat* or *Tunic*: Thoſe that cover the *Brain*, are by a peculiar Name call'd *Meninges* or *Matres*; of which more in their proper place. *Tunic.*

Fibre. A FIBRE (call'd likewiſe a *Filament) is a long ſlender Thread, and, like a Thread, is in the ſeveral Parts variouſly wound up into a great diverſity of Figures.* Theſe *Fibres* (according to the now prevailing Opinion) are all hollow, and percolated by ſome Fluid or other, which renders them in effect all Veſſels. There are four ſorts of them according to the vulgar Diviſion, *Carnous*, *Nervous*, *Tendinous*, and *Oſſeous*, of one or other of which, all the other Parts conſiſt.

Muſcle. A MUSCLE *is a fleſhy Part conſiſting of Fibres, and ſerving for Motion.* It is ordinarily divided into three parts, which are call'd the *Head*, the *Belly* and the *Tail*, of which the *Head* and the *Tail* are generally the *Tendons*, the *Head* being that Extremity which is fixt to the Part moſt ſtable; the *Tail* to the more moveable. *Muſcles* are likewiſe divided into *Simple* and *Compound*; the *Simple* are thoſe which have but one *Venter* or *Belly*; the *Compound* thoſe which have two or more; or otherwiſe, the *Simple* are thoſe *Simple and Compound.*

thoſe which conſiſt of a Simple order of *Fibres*, and the *Compound* of *Fibres* variouſly diſpoſed.

The *Belly* of a *Muſcle* is the *thick*, *fleſhy* part, into which are inſerted the *Arteries* and *Nerves*, and out of which iſſue the *Veins* and *Lymphæducts*. *Venter*, or *Belly*.

A TENDON *is the hard white part of a Muſcle, uſually placed at either Extremity of the Muſcle, and co-operating with it in its Action.* The Fibres of this are ordinarily thought to be Nervous, but (in my Opinion) are only Productions of the ſame *Fibres*, which make the *Belly* of the *Muſcle*, but their being more cloſely and firmly connected, makes the difference of appearance, and their whiteneſs proceeds only from the Blood's being partly excluded by the tightneſs of their Contexture; ſo that there ſeems to be no other difference between them, than there is between a Skein of Thread, and a Cord made of the ſame Thread. In the Limbs one of theſe Tendons is uſually fixt to an unmovable Point, the other to a movable: So that when the *Belly* of the *Muſcle* in *Contraction* is ſwell'd and ſhortned, the *movable* Point is drawn towards the *immovable*, by which means *Local* Motion is perform'd. Tendon.

An ARTERY is a *hollow Fiſtulous Channel, conveying Blood from the Heart to all Parts.* It ordinarily conſiſts of *three Coats*, or *Mem-* Artery.

Its Coats. *branes:* The outward, *Nervous* or *Tendinous:* The ſecond, *Carnous* or *Muſcular:* The third, *Glandulous* or *Vaſcular:* Thro' theſe is all the Blood of the Body conveyed towards the Surface. All *Arteries* begin with a Trunk, and growing gradually leſs and narrower end in Branches ſo minute, that they eſcape the Sight, unleſs aſſiſted with Microſcopes; by which, in the Tails of *Tadpoles*, and very ſmall *Eels*, the Extremities of the *Arteries* ſeem by the ſwift uninterrupted courſe of the Blood, to be continued to the Originations of the *Veins*, tho', thro' the tranſparency of thoſe Veſſels, the actual continuation be not viſible. The *Coats* of them are of a very firm, cloſe Contexture, by which means the *Blood* not being viſible thro' them, they generally appear white. In theſe the *Blood* proceeding from a greater Capacity to a leſs, is thereby ſomewhat obſtructed in its Paſſage; but being forced on by the motion of the *Heart*, diſtends the Coats of the *Arteries*, and thereby occaſions that *ſalient Motion* which we call the Pulſe.

Vein. A VEIN *is another Fiſtulous Channel*, for *the conveyance likewiſe of Blood*; *but its courſe is directly oppoſite to that of the Arteries.* For inſtead of a *Trunk diſtributed into Branches, and Capillaries*, this is a *Trunk* form'd out of the concourſe of *Capillaries*, which receive the *Blood* from the *Arteries* in the reſpective Parts, and re-convey it to the *Heart*. In theſe the Blood coming from narrow Channels into wider, finds leſs oppoſition, and therefore leſs force is requir'd to drive it on. But to ſupply that want of Protruſion, the *Veins*, (eſpecially thoſe of the lower Limbs) are furniſh'd with *Valves*, which are two *Membranes* placed oppoſite to each other in the Cavities of the Veins, cloſing 'em againſt any reflux of the Blood, and thereby ſuſtaining the weight of it in the great Trunks. The impulſe of the *Heart* being much broken in the *Capillaries*, and the Blood proceeding from narrow to wider Paſſages, the Veins have no Pulſation. For this reaſon it was not neceſſary that the *Coats* ſhould be ſo ſtrong and firm as thoſe of the *Arteries*. However, they are in their Texture alike; but thoſe in the *Veins* being thinner than thoſe in the *Arteries*, and the Blood appearing thro' them, makes them look blue in Diſſection, and not white.

Nerve.

A NERVE is a *round, white, long, ſmooth Body, like a Cord, deriving its Origin from the* Brain, *or* Spinal Marrow, *and ſerving* (as is ſuppoſed) *for the conveyance of* Animal Spirits. ~~The~~ *Trunk* ~~of~~ every *Nerve* is cover'd with a very thin *proper Membrane*, and conſiſts of innumerable ſlender *Fibres* infinitely diviſible, which are diſpers'd thro' every Part of the Body, where there is either *Senſe* or *Motion*.

Gland. A GLAND is a *ſoft*, *ſpungy*, *lax Body*, and *furniſh'd with a little Excretory Duct*, or Pipe, thro' which it emits that *Fluid* for the *Secretion* of which it is fram'd. It is ſuppos'd by *Modern Anatomiſts* to be only a Convolution of the *Capillary Artery*, to which a *Capillary Vein* is join'd, which, with the *Excretory Duct*, make up the Body of *Glands*, the *Organs* of *Secretion*. The *Excretory Ducts* ariſe from the *Glands*, which they help to compoſe. They ſpring from the Extremities of the *Arteries* and *Veins*, and carry off a Liquor ſeparated from the Blood.

The *Lymphatick Glands* have either *Lymphæducts* for their *Excretory Ducts*, or *Lacteal Veſſels*, as in the *Meſentery*.

Lymphæducts. The LYMPHATICKS, or LYMPHÆDUCTS, *are very ſmall, fine, hollow Veſſels, generally ariſing from the* Glands, *and conveying back to the Blood a tranſparent Liquor, which from the reſemblance it in ſhew bears to Water, is call'd Lymph.* Theſe, tho' not ſo viſible as the other Veſſels, becauſe of their Minuteneſs and Tranſparency, are however exiſtent in all Parts of the Body: But the difficulty of finding them has hinder'd them from being deſcrib'd in many Parts.

Lacteal Veins. The LACTEALS, *are a peculiar ſort of Lymphatick Veſſels for the conveyance of* Chyle, *improperly call'd Veins, proper only to the Meſentery and Inteſtines, from whence they ariſe, and*

and through which they run. They are not always full, at leaſt not of *Chyle:* When they are, which is when the Aliment is digeſted, and before it is paſs'd out of the *Inteſtina Tenuia*, they appear white, at other times tranſparent, ſomewhat like the reſt of the *Lymphæducts.*

Chyle. CHYLE *is a white Juice about the conſiſtence of* Milk, *form'd out of the Parts of the diſſolv'd* Aliment, incorporated with the *Potables* by the *Periſtaltick* Motion of the *Stomach* and *Inteſtines*, and thereby diluted, and render'd thin enough to enter the Mouths of the *Lacteals*, whence it is convey'd to the *Receptacle*, and thence unto the *Blood*, of which it is the firſt Matter and Subſtance. The taſte of it, as we have experienced in *Dogs*, is ſomewhat *brackiſh*, which argues it to abound more with *Salts*, than *Milk* does.

Milk. MILK *is alſo a white Liquor*, but *whiter, thicker and ſweeter* than the *Chyle* it ſelf, from which it is deriv'd, and probably without much more Artifice or Alteration, than the leaving behind ſome *aqueous* and *ſaline* Particles.

Blood. BLOOD *is a mix'd red Liquor, circulating in the* Arteries *and* Veins *of the Body, which while it is in the Veſſels appears uniform:* But when let out, and cold, ſeparates *ſpontaneouſly* into a *red* and a *tranſparent* Part, of which the firſt is call'd *Cruor*, and the latter *Serum.* Cruor, *Serum.* The *Cruor* conſiſting of Parts more *Fibrous*, is generally gather'd when cold into a *Coagulum*, and ſwims in the *Serum*, which ſtill retains the form of a *Liquor*.

Analyſis of the Blood. By the *Chymical Analyſis* it is found to conſiſt mainly of *Phlegm*, as the *Baſis* or *Vehicle*, a great quantity of *Volatile Salts*, a good deal of *Oyl*, and ſome *Earth* or *Caput Mortuum*, out of which a ſmall quantity of *Fixt Salt* may be extracted.

Appearance thro' the Microſcope. By *Microſcopical* Obſervations, whilſt circulating in the *Veſſels*, it is diſcern'd to conſiſt of a great number of ſmall *red Globules*, floating in a *tranſparent* Liquor, which are ſuppos'd to be the *Cruor* and *Serum*, which are ſo diſtinct when let out. But tho' the motion which is very *rapid*, may make the *Fibres* or *Filaments* of the *Cruor* appear round, and perhaps by a kind of *Whirling* or *Rotation* really convolute them, yet that their *Figure* is not *Globular*, when let out, may fairly be collected from their *Cohæſion*, or *hanging together* in a lump, which *ſpherical* Bodies touching one another but in a very ſmall Superficies are not apt to do. But on the contrary, this Property argues an *implication* of their *Fibres* within one another.

The SERUM is ſufficiently deſcrib'd in the foregoing Article: But it affords another Liquor little differing from it, in colour or conſiſtence, or indeed in any other diſcoverable Quality: Except that the *Serum* is probably

Lymph.

charg'd with more recrementitious Parts. This Liquor is ſeparated from it poſſibly in all parts of the Body for particular uſes, and is return'd again to the Blood by peculiar Ducts of its own, and is therefore dignified with a ſeparate Name, and is call'd the *Lymph.* This ſome would have to be the immediate Matter of Nutrition, which ſhall be examin'd in its proper Place.

Animal Spirits.
Triple diviſion of Spirits.

SPIRITS have been *anciently* diſtinguiſh'd into three ſorts, *Animal*, *Vital*, and *Vegetative* : But the *Moderns* have reduced them to one ſort, *viz.* the *Animal* : About the Nature of which, and the Matter whence they are form'd, great Diſputes have ariſen among *Anatomiſts* : Tho' the Exiſtence of them have not yet been demonſtratively prov'd.

Of doubtful Exiſtence.

Not definable.

It is hard to define what could never yet be brought under the Judgment of our *Senſes*, ſo that every Man is at liberty to entertain what Notions he pleaſes concerning them, of which ſome have been extravagant enough. All that we ſhall offer concerning them (if they have a real Exiſtence) is that they muſt needs be extream ſubtle Bodies, which eſcape all manner of Examination by the *Senſes*, tho' never ſo well aſſiſted, and pervade the Tracts of the *Nerves*, which yet have no diſcoverable *Cavity* or *Perforation*, nor could ever by any Experiment be collected, yet are *conſtantly moving* in vaſt Quantities, as they muſt of neceſſity be, to perform all thoſe mighty Operations, which are aſcrib'd to them. However, the Antiquity of the Opinion claims ſome Reverence: By their help we are ſupply'd with a vaſt number of *precarious Solutions* of great *Phænomena*; and without them we muſt leave a great *Chaſm* in the *Philoſophical Hiſtory* of *Animal* Bodies. They are ſuppos'd to be ſeparated in the *Brain* from the *ſubtleſt* parts of the *Blood*, and from thence to be carry'd by the *Nerves* to all the parts of the Body, for the performance of all *Animal* and *Vital Functions*. But of what peculiar Nature they are, we leave thoſe to wrangle about, who are better ſatisfy'd of their Exiſtence.

Of great Antiquity in Notion.

Bile.

Bile is a *yellow, bitter Juice, ſeparated from the* Blood *in the* Liver, *and from thence diſcharg'd by the* common Duct *into the* Duodenum. It is of *two* ſorts, one thinner, more mild, and more enclin'd to a greeniſh Colour than the other, and is ſeparated from the Glands of the Liver immediately into the *Porus Bilarius*. The other which is ſeparated from the *Glands* of the *Liver* likewiſe into the *Gall Bladder*, by *Roots* or *Ducts* proper to it ſelf, is of a *brighter yellow*, of a *greater* conſiſtence, and *more Bitter* and *Acrimonious*.

Of two ſorts.

Analyſis.

The *Bile* by *Chymical Analyſis* affords ſome *Sulphur* or *Oyl*, ſome *Volatile Salt*, and a good deal of *Fixt Salt* (in which particular it differs conſiderably from all other *Animal* Liquors) and a pretty quantity of *Caput Mortuum* or *Earth*, and in this as all the reſt the *Baſis* is *Phlegm.*

Salival & Pancreatick Juices. The SALIVAL and PANCREATICK Juices, reſemble one another ſo nearly in their Quantities and Appearance, that we need not ſeparate them in their Deſcriptions. They are *tranſparent* Liquors, conſiſting chiefly of *Phlegm*, mixt with a Volatile Salt, and nothing elſe diſcoverable. *Analyſis.* The firſt ſeparated by the Glands about the *Mouth* and *Fauces:* The latter by the *Pancreas*, which diſcharges it ſelf into the *Duodenum.*

Seed. The SEED *is ſeparated in the* Teſticles, *and contain'd in proper Veſicles, and is when well conſtituted a white Liquor, thicker than any other in the Body, conſiſting almoſt entirely of* Oyl, *and* Volatil Salts, *which are blended together by the mediation of a little* Phlegm. *Analyſis.* It's activity ſeems mainly to be deriv'd from the *Volatile Salts*, with which it abounds far beyond any other *Animal Liquor.*

Animalcules in the Seed. The uſe of the *Microſcope* has diſcover'd (as ſome fancy) floating in it ſeveral *Worm-like Bodies*, which move up and down as if they were alive, and have by Mr. *Lewenhoeck*, the firſt diſcoverer of them, and divers others after him, been maintain'd to be real *Animals*, each of them a true *Fœtus*, a *little Man*, whoſe ſhape likewiſe ſome pretend to diſcover by their Glaſſes: Of which Opinion we ſhall diſcourſe more at large in the proper Place.

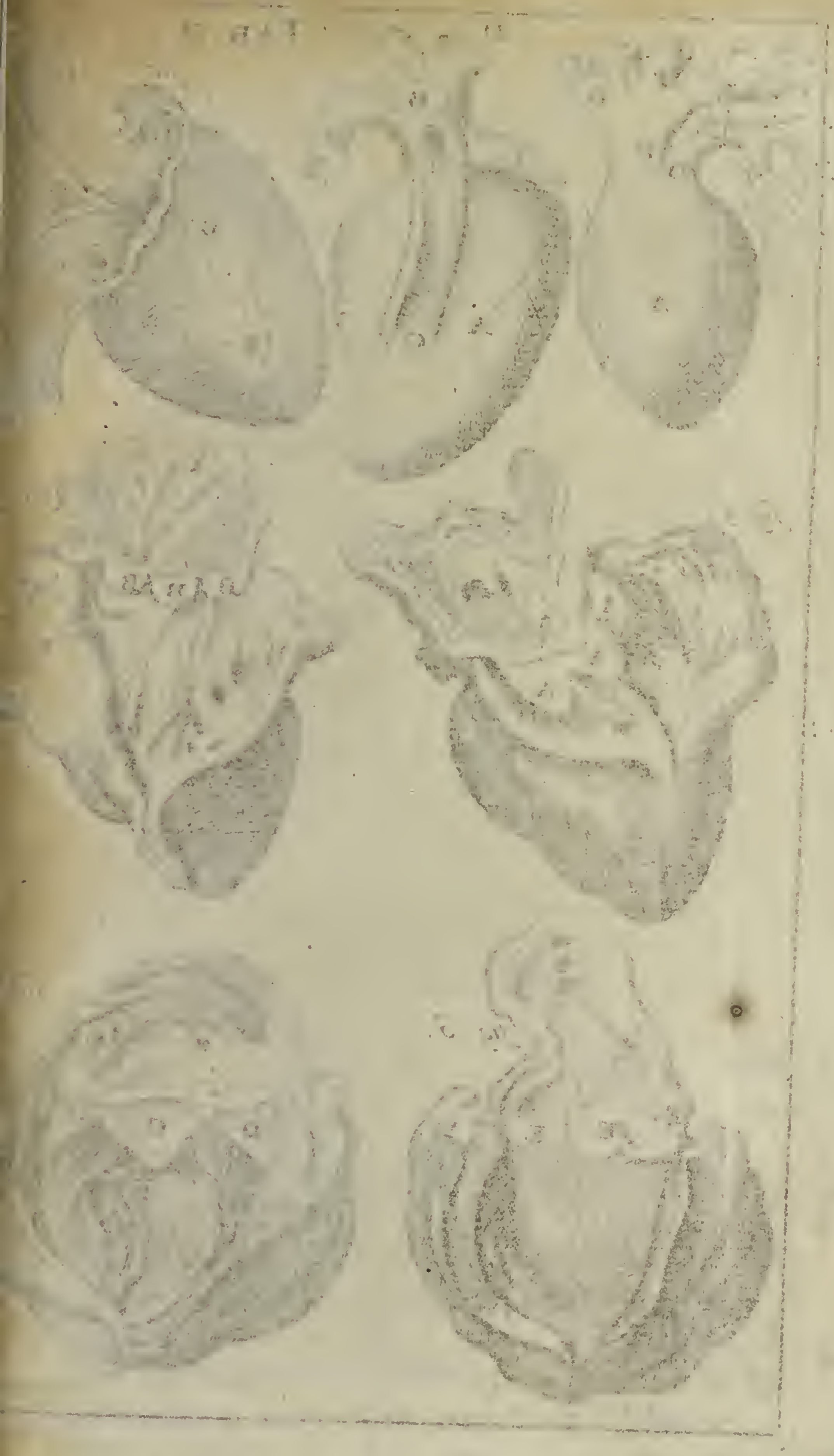
Mucus Urethræ. The *Genital* Parts afford likewiſe another Liquor which is *Viſcous* and *Tranſparent*, and ſerves only to *line* and *lubricate* the Parts that the *Seed* may ſlip the more freely without adhering. This comes from Glands lately diſcover'd by Mr. *Cowper* about the *Penis*, and is that which in Women is commonly miſtaken for the *Semen.*

The Mucus of the *Joynts*, is a *Mucilaginous Liquor*, ſeparated by its proper *Glands*, conveniently placed in the *Interſtices* of the *Bones*; where theſe Glands are gently preſt by the Motion of the Parts. It ſerves to make the Extremities of the Bones or Joints ſlip eaſily.

Mucus Narium. The *Mucus* of the *Noſtrils* is ſeparated by its proper Glands, placed in the internal *Membrane* of thoſe Parts, which ſhall be ſpoken of in its proper Place. As ſhall,

Cerumen Aurium. The *Ear-Wax*, which has alſo its proper Glands to ſeparate it from the Blood, placed in the outward Paſſages of the Ears.

There are divers other *Excrementitious Humours*, ſuch as the *Urine*, the *Sweat*, &c. which need no Deſcription, and ſhall be ſpoken of with the Parts to which they belong.



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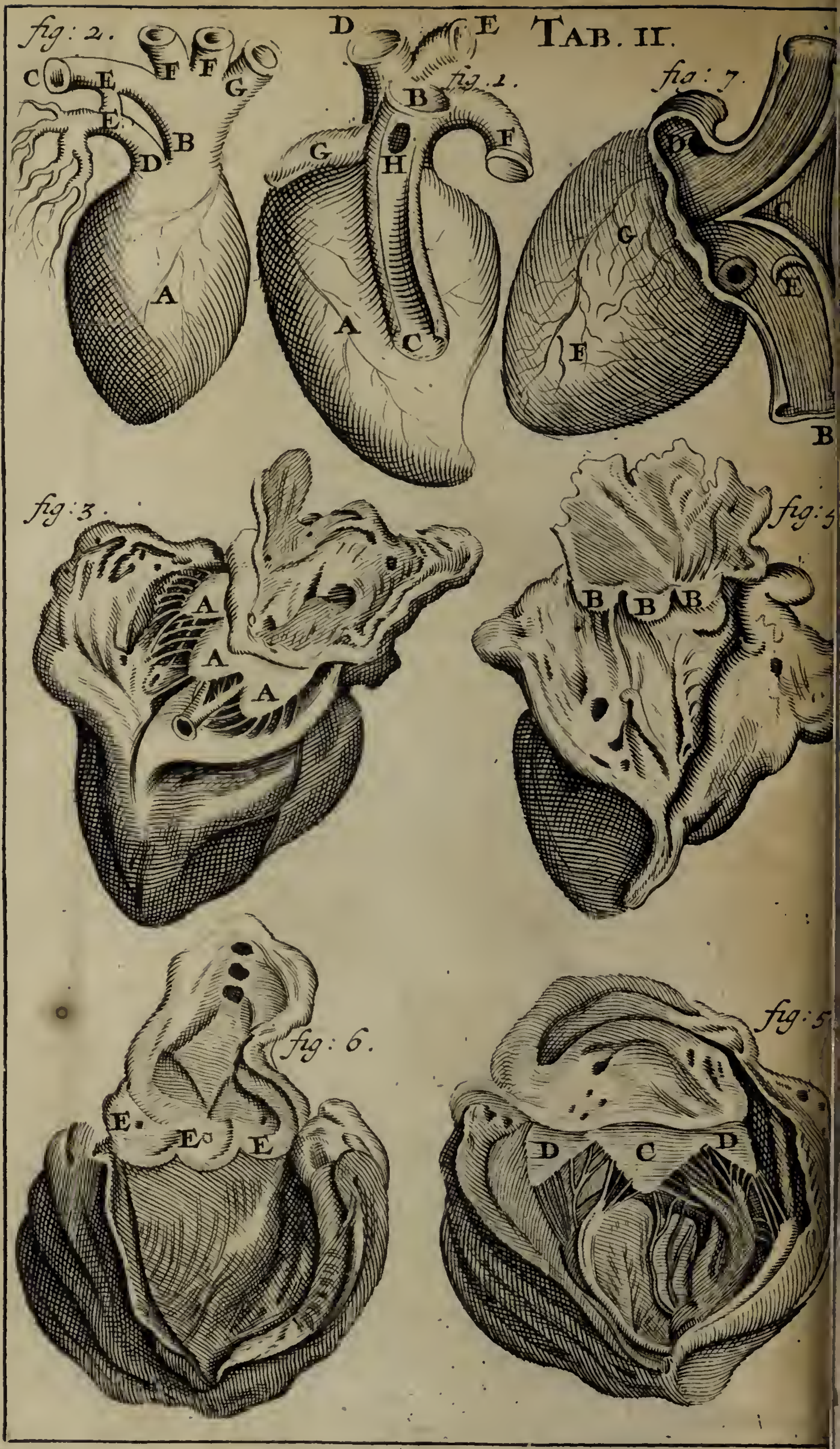
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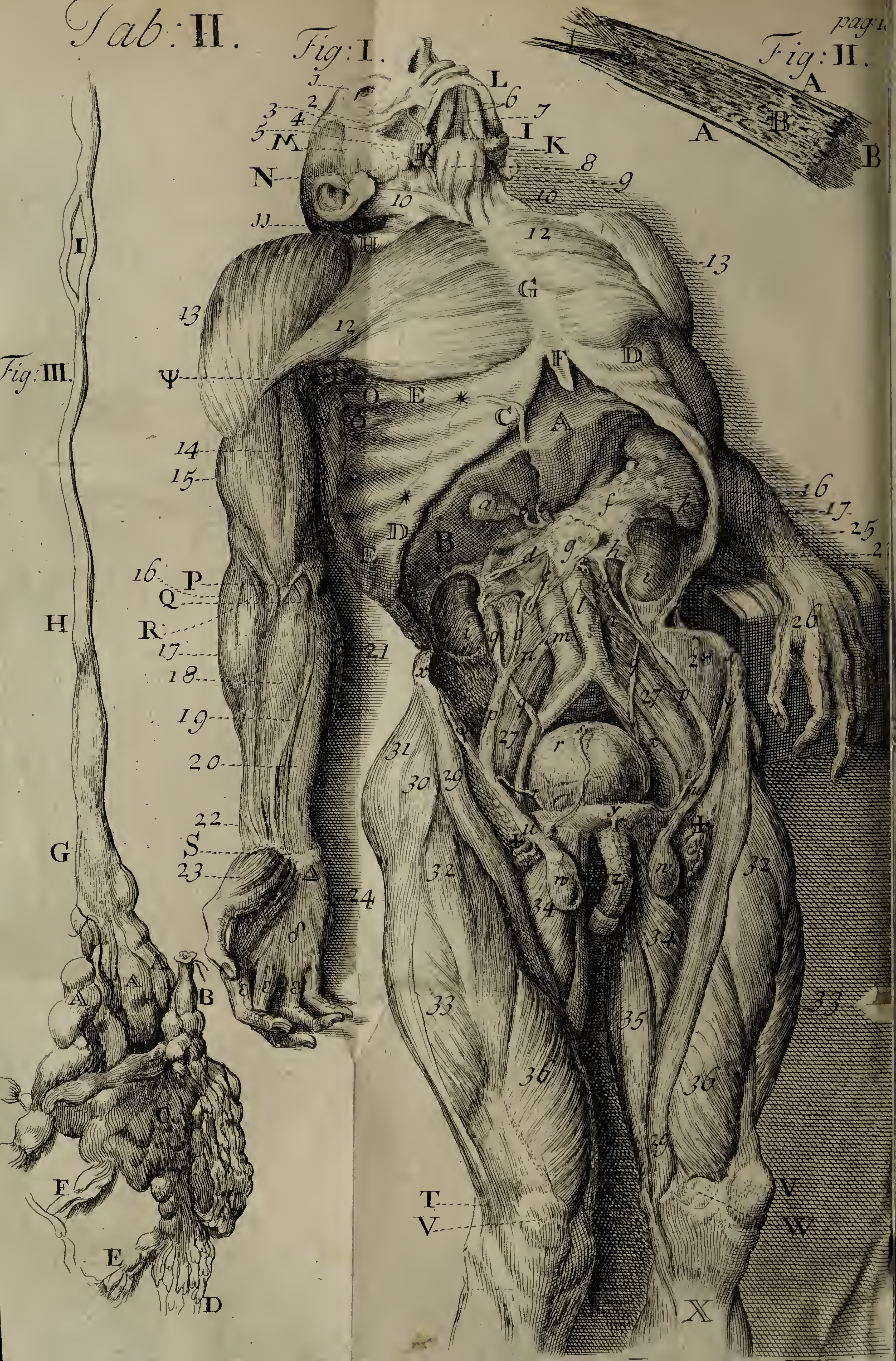
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CHAP. II.

Of the Cuticle or Scarf-Skin.

SYLLABUS.

Conſiderandorum in

** Cuticula.*
- *Adnaſcentia——Cuti*
- *Tenuitas*
- *Squamulæ* { *per Microſcopium ſpectandæ.*
- *Lamellæ* { *per Veſicationem ſpectandæ*
- *Glandulæ——eodem modo.*
- *Pori* { *Pro Pilis & Excretoriis Cutis.*
- *Origo.*
- *Uſus.*

* Vide *Tab.* I.

Cuticle.

THE Cuticle *is a thin pellucid Membrane, void of Senſe, and ſerving as a cover for the* Skin.

Adherence to the Skin. *Tenuity.* *Squamulæ.*

Tho' it lies firſt expos'd to view, yet becauſe of its cloſe coherence to the *Skin*, it is very rarely diſcern'd from the *Skin* it ſelf, but by *Anatomiſts*, who generally ſeparate it by an *actual Cautery*, by which it appears to be a very thin and *ſimple Membrane*, which expos'd to the *Microſcope* (as ſome pretend) appears to conſiſt of *Scales.*

But

Lamellæ. But if inſtead of raiſing it by an *Actual Cautery* on a *dead* Body, we examine that which is raiſed by *Cantharides*, or any other *Veſicatory*, we ſhall find it to conſiſt of ſeveral *Membranes* exceedingly thin and fine, and not altogether deſtitute of Bodies reſembling *Glands*, which in that ſtate become viſible to the naked Eye. *Glandulæ.*

Pores of theCuticle. It is extended over the whole Body, and being it ſelf *inſenſible*, ſerves to defend the ſubjacent Skin which is *extreamly ſenſible.* It is full of innumerable *Foramina* or Perforations, as well for the *Hairs* as for the *Sweat*, and *Effluvia* of the Body, which paſs by *inſenſible* Perſpiration, yet not ſo full but that it obſtructs that exceſſive diſcharge of ſerous Humours, which otherwiſe would be evacuated by the *Glands* of the *Skin*, as appears plainly by the great quantities diſcharged by *Bliſters*, or any other Accident, whereby the Skin is denudated.

Origine. Some would have it to be form'd from the groſſer part of the *excrementitious ſerous Humours* eliminated through the Pores of the *Skin*, and condens'd upon the Surface, like the *Pellicle* which appears upon Evaporation on the Surface of the *Serum* of the *Blood.*

They that pleaſe themſelves with this Fancy, are at liberty to enjoy it; Becauſe it is not a Point worth controverting. But Monſieur *Lewenhoeck* with more probability thinks it to be an Expanſion only of the excretory Ducts of the Glands of the Skin.

It has no proper Veſſels, at leaſt none that have been diſcover'd by Anatomiſts: Yet having had the Curioſity to examine ſeveral times the *Cuticle* raiſed by *Veſication*, I have always found in it *Glands*, or Bodies like *Glands*, which were in that ſtate pretty conſpicuous, and pretty numerous, from whence it ſeems to me certain that there are Veſſels, though not diſcoverable by the Eye, nor perhaps in *dead* Bodies by the *Microſcope*; becauſe of the Coincidence and Flaccidity conſequent of Death, which may eaſily cauſe Veſſels ſo exceedingly minute to diſappear.

I could wiſh therefore that they who are furniſh'd with good *Microſcopes*, would examine the *Cuticle* taken off by *Veſication*, which I am perſwaded would diſcover ſomething yet unobſerv'd.

CHAP. III.

Of the Skin.

SYLLABUS.

Notandorum in

Cute
- *Rete Vaſculoſum*
- *Structura*
- *Papillæ Pyramidales*
- *Glandulæ Miliares*
- *Lineæ*
  - *Rhomboidales*
  - *Spirales*
- *Pori*
- *Craſſities*
- *Connexio*
- *Uſus*

Cutis or Skin. Reticular Veſſels.

IMmediately under the *Scarf-Skin* or *Cuticle* lies a RETICULAR Body of *Veſſels* peculiar to that part, containing a mucous Liquor, from the Tincture of which, the Sagacious *Malpighius* imagines the colour of the Skin to be deriv'd: Which Conjecture he draws from his Obſervation, that the *Skin* as well as *Cuticle* of *Blacks* is white, and that they differ in no other Circumſtance from thoſe of *Europeans*, but in this particular.

Structure.

The SKIN it ſelf is in ſeveral Animals of a Texture very various, as appears by the differ-

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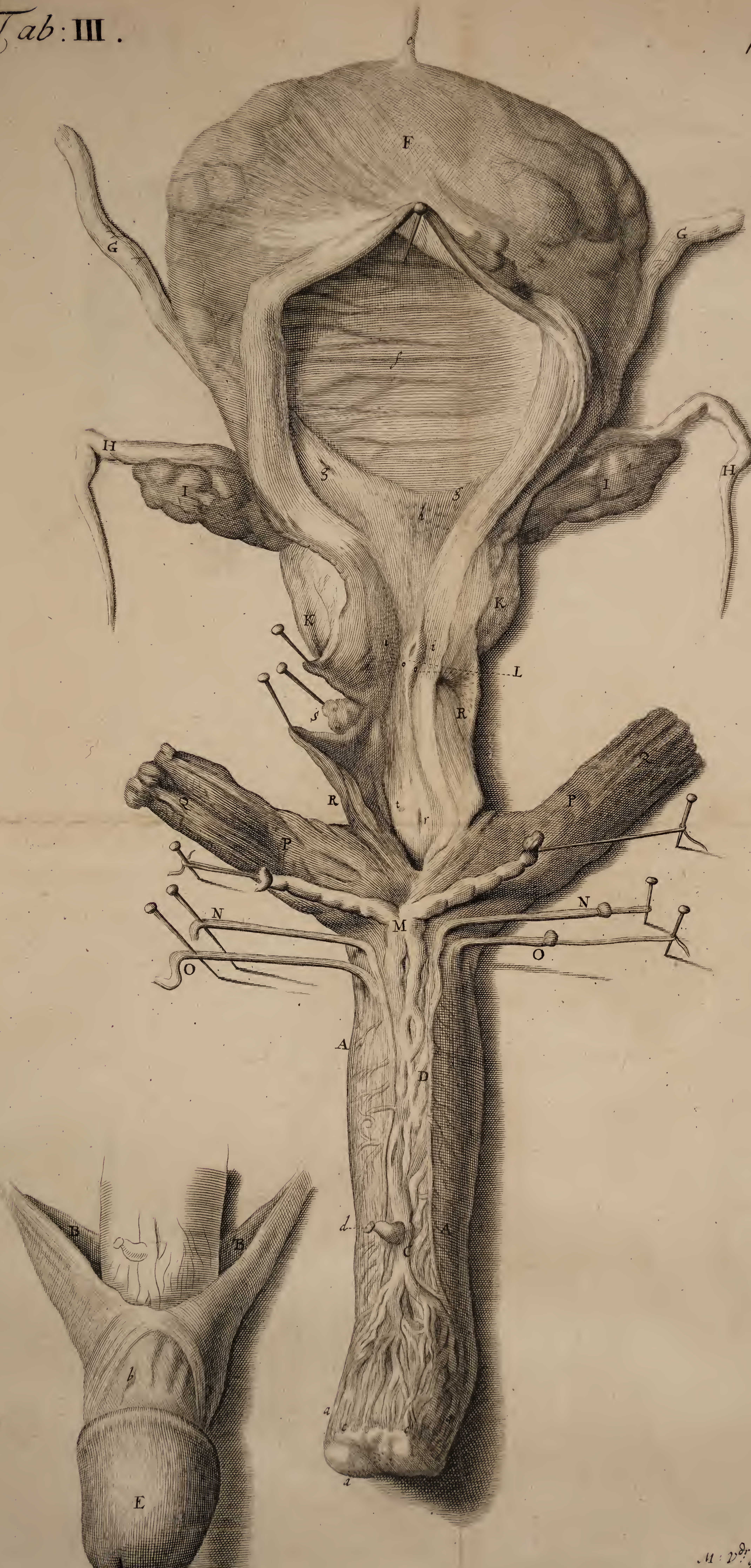

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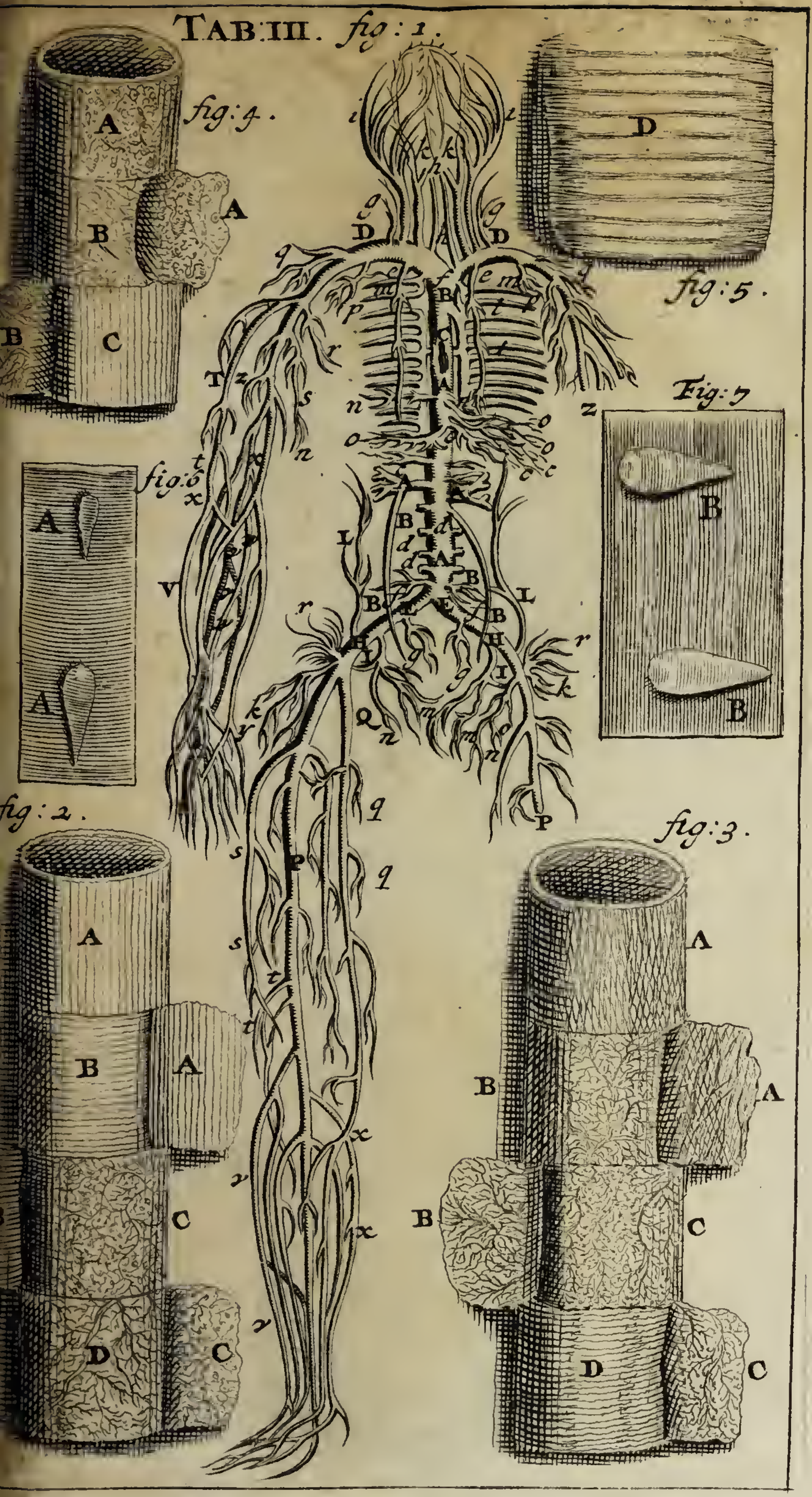
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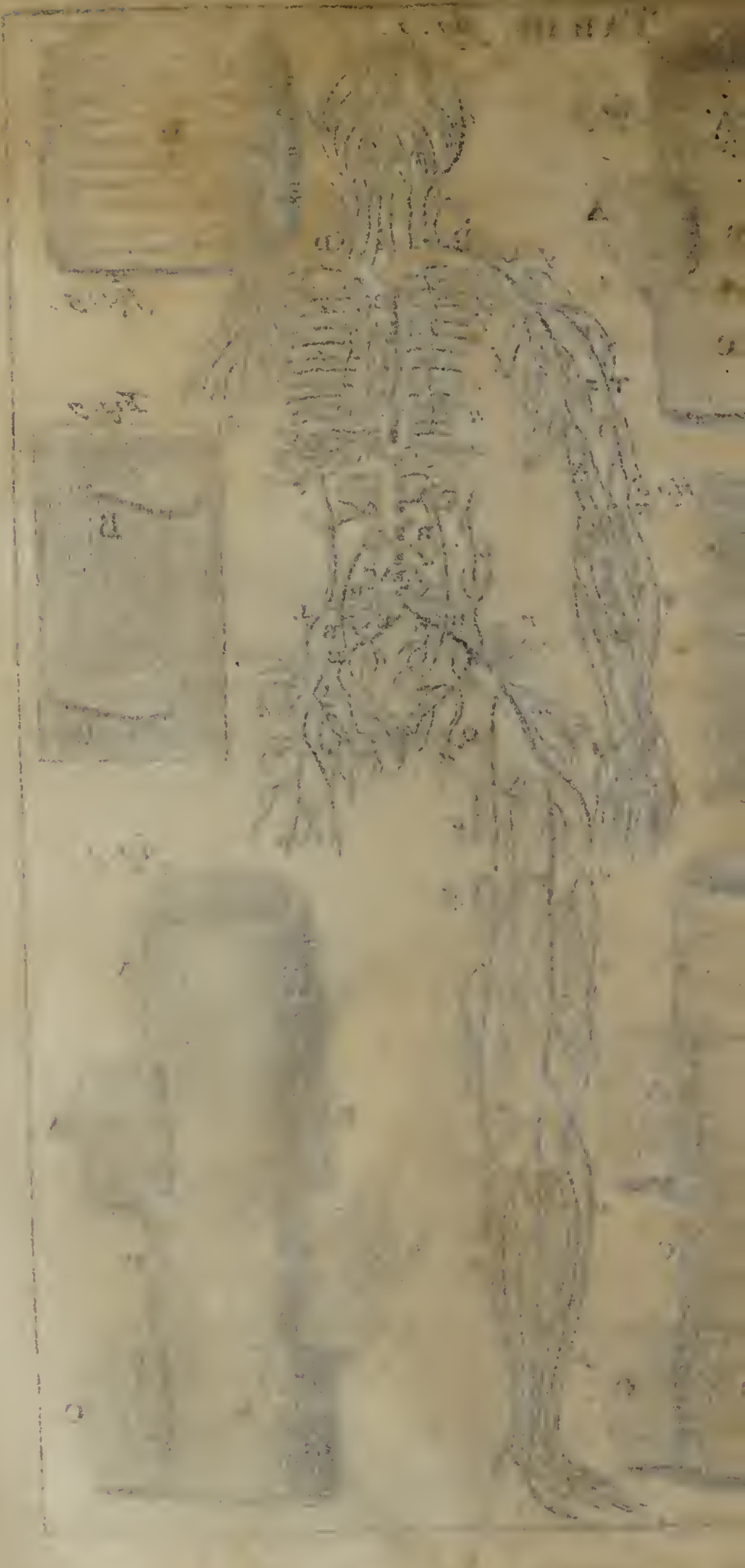
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different ſorts of Leather made of Skins. That of *Hogs* and *Animals*, which have a *Membrana Adipoſa* ſpread immediately under the Skin, approaches neareſt the Human, which upon the Score of the vaſt multitude of *Sudatory* Pores (far exceeding in number thoſe of Creatures cloath'd with Hair) is more looſe and ſpungy. It conſiſts of Fibres of its own, or according to *Steno* is form'd out of the Productions of the *Tendons* of the ſubjacent Parts, and furniſh'd with an infinite number of PYRAMIDAL PAPILLÆ, which are moſt conſpicuous in the Skin of the *Soles* of the Feet, and of the *Palms* of the *Hands*, and are interwoven with innumerable *Nervous Fibres*, which render it extremely ſenſible; and through thoſe it becomes the immediate and proper *Organ* of the *Senſe* of *Feeling*.

Papillæ Pyramidales.

Among theſe likewiſe lie a vaſt multitude of *Glands*, which are call'd the MILIARY GLANDS, and are each of them ſerv'd with a Branch of an *Artery*, *Vein*, and *Nerve*, as alſo a proper *excretory Duct*, thro' which, the matter of *Sweat* and *inſenſible Tranſpiration* is ſecreted, and ſent forth at the Perforations of the *Cuticle*.

Glandulæ Miliares.

It is mark'd externally with a great number of LINES, which interſecting one another at acute Angles, make generally a *Rhomboidal* Figure, though in ſome places they

Lines.

Rhomboids

Spiral. they are turn'd *Spirally*, as at the ends of the *Fingers*: And in ſome likewiſe they are cut deeper, and are more apparent as in the Palms of the Hands, and at the *Flexures* of the *Elbow* and *Hams*, and *Soles* of the *Feet*.

Pores of two kinds. It is perforated every where with PORES, which are by *Anatomiſts* obſerv'd to be of two kinds, *greater* and *leſs*. Thro' the former of theſe the HAIR germinates, which is implanted with a kind of *Bulbous* Root into the *Papillæ* before mention'd, as are likewiſe the FEATHERS in *Fowls*. *Hairs.*

Thickneſs. The *Skin* is by ordinary computation eſtimated to be about ſix times as thick as the *Cuticle*: But on the *Head* and *Back*, and under the *Heel* it is much thicker: In the *Palms* of the *Hands* and the *Sides*, on the *Face* and *Fore-head*, and eſpecially on the *Lips* it is much thinner.

On the *Face*, *Penis*, and *Scrotum* it is ſofter than elſewhere, and on the *Neck*, *Back* and *Soles* of the *Feet* it is harder. But in different *Subjects* and *Climates* there is in reſpect of all theſe things a great variety and uncertainty.

Connexion It is generally connected to the ſubjacent Parts by the *Membrana Adipoſa*, and its proper *Veſſels*, *Arteries*, *Veins*, *Nerves* and *Lymphæducts*, as well where there is no ſubjacent *Fat*, as where the Muſcles under it, as at the *Lips*, *Eye-brows*, and *Anus*, ſend Fibres into it.

In ſome places it adheres ſo very looſely, that it is eaſily ſeparated, as about the *Belly*, *Legs* and *Arms*: Tho' in theſe along the *Linea Alba* it is more firmly connected, and on the *Soles* of the *Feet*, and *Palms* of the *Hands*, ſo as not to be ſeparated without difficulty. On the *Forehead* it grows to the Fleſh, and almoſt all over the *Face*, eſpecially about the *Ears* and *Lips*, where the *Tendons* of the Muſcles end in it.

Uſe.

The uſe of it is to wrap up, and cover the whole Body, and to be a ſort of a general *Emunctory*, and a proper *Organ* of Feeling.

Diſeaſes.

Both the *Cuticula* and *Cutis* are liable to ſeveral Accidents or Morbid Alterations, of which thoſe of the *Cuticula* are moſt of them of little moment, and ſcarce worth minding, but for the deformity which they bring along with them, ſuch as *Morphew*, *Freckles*, *Sun-burn*, &c. which are ordinarily cur'd with *Coſmeticks*, with which the *Ladies*, who are moſt ſtudious of their Beauty, are generally not unfurniſh'd.

Of the Cuticle.

Of the Skin Leproſy.

The LEPROSY only, both for its obſtinacy in reſiſting all manner of Medicines, as well as for its loathſomneſs, and ſometimes fatal Conſequences, may demand the conſideration of a *Phyſician*, and properly enough in this place: For, tho' the Root and Cauſe may juſtly be thought to lie elſewhere, yet the viſible *ſeat* of it is the *Cuticula*, and Surface of the Skin.

Cauſe. This Diſtemper ariſes from the ſame Cauſe, that moſt other Diſeaſes of the *Cuticula*, and *Cutis* do, but in a more exalted Degree; for all of them proceed from thin *Salt* Humours thrown off from the Blood, and arreſted by the denſity of the *Cuticula*, not affording them ſo free a Paſſage as the quantity of them requires. This Diſeaſe is much more frequent in hot Countries than with us, where the Heat of the Sun rarifying extremely the Humours of the Body, and ſubtilizing the Blood, cauſes and requires a more liberal Perſpiration, in the courſe of which, the *Salts* (in their own Nature Volatile) are ſtill more volatiliz'd, and thereby render'd more Acrimonious.

Lepra Græcorum. Theſe *Salts* being by the appointment of Nature to be eliminated thro' the Pores of the *Skin*, along with the recrementitious *Serum* their proper Vehicle, are in hot Countries convey'd in greater plenty to the ſurface of the Body, by reaſon of the extraordinary rarity of the Pores from the heat of the *Climate*, than in theſe *Northern* Regions they ordinarily are, and ſticking in their Paſſage in the thin dry Membrane of the *Cuticle*, the aqueous Parts, which are their Vehicle, ſlip away from them by inſenſible evaporation, and leave them there to corrode and fret it, 'till at length thro' the quantity ſo gather'd, the Membrane becomes dry, brittle, and white, which is the true and ſole Cauſe of the *Deſquamation* or falling away in white Scales, which *whiteneſs* as well as the *brittleneſs* proceeds meerly from the quantity of theſe *Salts*, which are themſelves white; and when the moiſture is drawn from them, being aculeated, and having inſinuated themſelves into the Pores of the *Cuticle*, diſſolve the continuity of it by their Points and Edges, which ſo dry'd and broken, is apt upon the leaſt Attrition to fall off as in the manner above mention'd.

There is another kind of this Diſtemper, *Arabum.* which is call'd LEPRA ARABUM, (as the former is GRÆCORUM) from the frequency of it in thoſe Countries, which, tho' different in appearance, carrying a dry Scabby Cruſt, ſeems to me however to differ only in degree. For, as in the former Caſe the Salts being left deſtitute of their Humidity, which was their Vehicle, are not ſo active, and therefore affect only the *Cuticle*, to which they are immediately contiguous, or perhaps the ſurface of the Skin, which is ſometimes made rough and uneven by them; in the latter Caſe theſe *Salts* with their Vehicle crowding faſter than they can be evaporated thro' the Pores of the Skin (being ſtill *in Fluore*, and ſo more *Cauſtick*) corrode deeper, and eat not only the *Cuticle*, but the *Excretory* Veſſels, and Surface of the *Skin* it ſelf, which thereby ſpues out a Liquor ſomewhat thicker than uſual, which when the thinneſt and moſt aqueous Parts are evaporated, is condens'd into that *Cruſt* or *Scab* which is the *Pathognomonick* of this Diſeaſe.

Moſt Inveterate *of all* Cutaneous Diſeaſes.

I have choſen to be more particular upon this Diſeaſe, becauſe it is the moſt exquiſite of all the *Cutaneous* Diſtempers, which ſeem to differ from it in nothing, but the extent of their Seat, and the ſtrength and continuance of their Cauſes.

The Small Pox.

Thus the SMALL POX, not having its Foundation in any permanent habitual Indiſpoſition, either of the Climate, or Body, has its Period within a limited time, ſufficient to extrude the *Peccant* Matter thro' the Pores of the *Skin*. For in this Diſeaſe the *Salt Serum* of the Blood being by an accidental *Fever* (ariſing from other Cauſes, than the conſtant Habit of the Body, or Diſpoſition of the Climate) thrown in great quantities upon the *Glands* of the *Skin*, acts much after the ſame manner with the corroſive Matter in the *Lepra Arabum*; that is, it frets the *Cuticle*, and ſurface of the *Skin*, much as the other does: But when the Blood is fully deſpumated, and no freſh extraordinary ſupply is ſent to theſe Parts, the *Scabs* dry, and fall off, and the *Skin* recovers its former State, except that the *Eſchars* of theſe Ulcers, which were then rais'd, generally remain viſible ever after, Yet ſometimes the Matter being not very corroſive, nor very plentiful, the Impreſſions it leaves are ſo light, that the *New Cuticle*, that ſupervenes afterwards, is ſufficient to obliterate them. Thus the Cauſe ceaſing, the Effect does ſo likewiſe.

If therefore any Body ſhou'd call the *Small Pox* a temporary critical *Lepra*, coming upon an extraordinary occaſion, I ſee no reaſon to impugn his Notion: And tho' the Treatment be, and ought to be different, it is becauſe more reſpect is had to the Internal accidental Cauſe, than to the External Symptoms, and their Effects upon the Skin.

Why but once.

Why the *Small Pox* ſeldom viſits any Perſon more than once in his Life time, has been a famous *Problem* much agitated with very little Succeſs; and therefore, if I ſucceed in my Attempt to reſolve it no better than others have done before me, I ſhall not think it any loſs of Reputation, but ſhall freely wiſh others more Happy in theirs, when they undertake to reform my Notion.

Alteration *in the* Skin *the* Cauſe.

I conceive therefore that the Alteration made in the Skin by the *Small Pox*, at whatever Age it comes, is the true Reaſon why that Diſtemper never comes again. For the diſtention, which the *Glands* and Pores of the Skin ſuffer at that time, is ſo great, that they ſcarce ever recover their *Tone* again, ſo as to be able any more to arreſt the Matter in its Courſe outwards long enough, or in ſuch quantity, as to create thoſe *Ulcerous Puſtules* which are the very *Diagnoſticks* of the *Small Pox.* For tho' the ſame *Feveriſh* Diſpoſition ſhou'd, and may again ariſe in the Blood, yet, the Paſſages thro' the Skin being more free and open, the Matter will never be ſtopt ſo there, as to make that appearance, from whence we denominate the *Small Pox.*

Features *why* permanently inlarg'd *by the* Small Pox.

Accordingly we generally obſerve, that in thoſe Perſons, who have been ſeverely handled by the *Small Pox*; the *Face* (which is generally the fulleſt from the Obſtruction which the Matter meets with upon the account of the greater Conſtipation of the Pores of the *Cuticle*, by reaſon of its being conſtantly expos'd to the Air) ſeldom returns to its former Dimenſions. This enlargement I think is to be accounted for, from the Dilatation of the *Areolæ* of the *Glands*, and Pores of the *Skin*, and not from any Augmentation of the Subſtance it ſelf.

I am the further confirm'd in this Opinion from the Obſervation, that Nurſes and others, that attend cloſely upon Perſons Sick of the *Small Pox*, are frequently ſo far affected with the Diſtemper, as to feel ſome very light Diſorder, and, with or without that warning, to have two or three

Eruptions. That it comes to no more I attribute to the free Courſe which the Matter has thro' the Pores of the *Skin.* With this alſo agrees the conſtant Obſervation, that People of Coarſe-grain'd *Skins*, in whom the Pores are largeſt, are moſt favourably treated by this Diſtemper, which likewiſe conſtantly leaves fine *Skins* much coarſer than it found them.

Meaſles, Scarlet Fever, &c.

What has been ſaid of the *Small Pox*, will ſuffice to ſolve the *Phænomena* of the *Meaſles*, *Scarlet Fever* and *Eryſipelatous Inflammations* which differ only in degree, or occaſion.

This courſe and effect of theſe *Salt Serous* Humours are likewiſe applicable to the *Itch* and other *cutaneous* Eruptions, which we not deſigning a formal Treatiſe of here, leave others to apply as they ſee occaſion, which it will be eaſie for them to do.

CHAP.

CHAP. IV.

Of the MEMBRANA ADIPOSA, *and its* FAT, *and of the* CARNOSA ſeu Muſculoſa.

SYLLABUS.

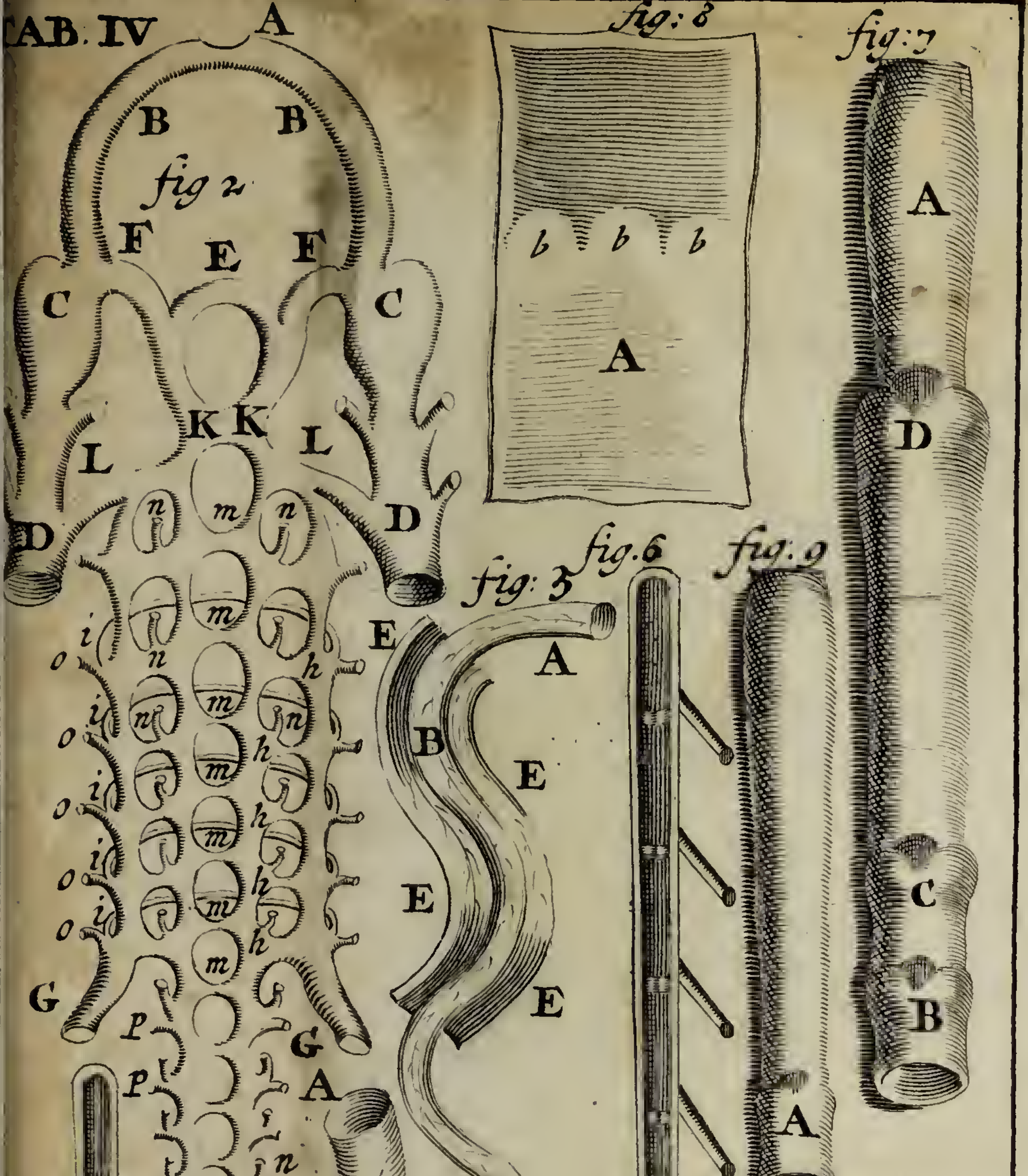
Conſiderandorum in

- *Membrana Adipoſa*
    - *Pinguedo*
    - *Locus*, *Subſtantia*, *Uſus*, *Incommoda* — *Pinguedinis*
    - *Cellulæ Adipoſæ*
    - *Sub ea Panniculus Carnoſus*

Fat. IMmediately under the Skin lies the FAT, which is call'd in *Latin Pinguedo*, and in *Engliſh* by the general Name of *Fat*, in contra-diſtinction to the *Adeps*, *Sevum* or *Suet* and *Leaf*, which are found in the Cavities of the *Abdomen*, and differ ſomewhat from each other in conſiſtence.

Where found. This *Fat* is found all over the Body co-extended to the Skin it ſelf except on the *Forehead*, the *Eyelids*, *Penis*, and *Scrotum*. In emaciated Bodies, inſtead of this *Fat*, we find a ſort of flaccid tranſparent Membrane, which is nothing elſe but the *Loculi* or *Cellulæ Adipoſæ*, in which the *Fat* of Bodies in good

TAB. IV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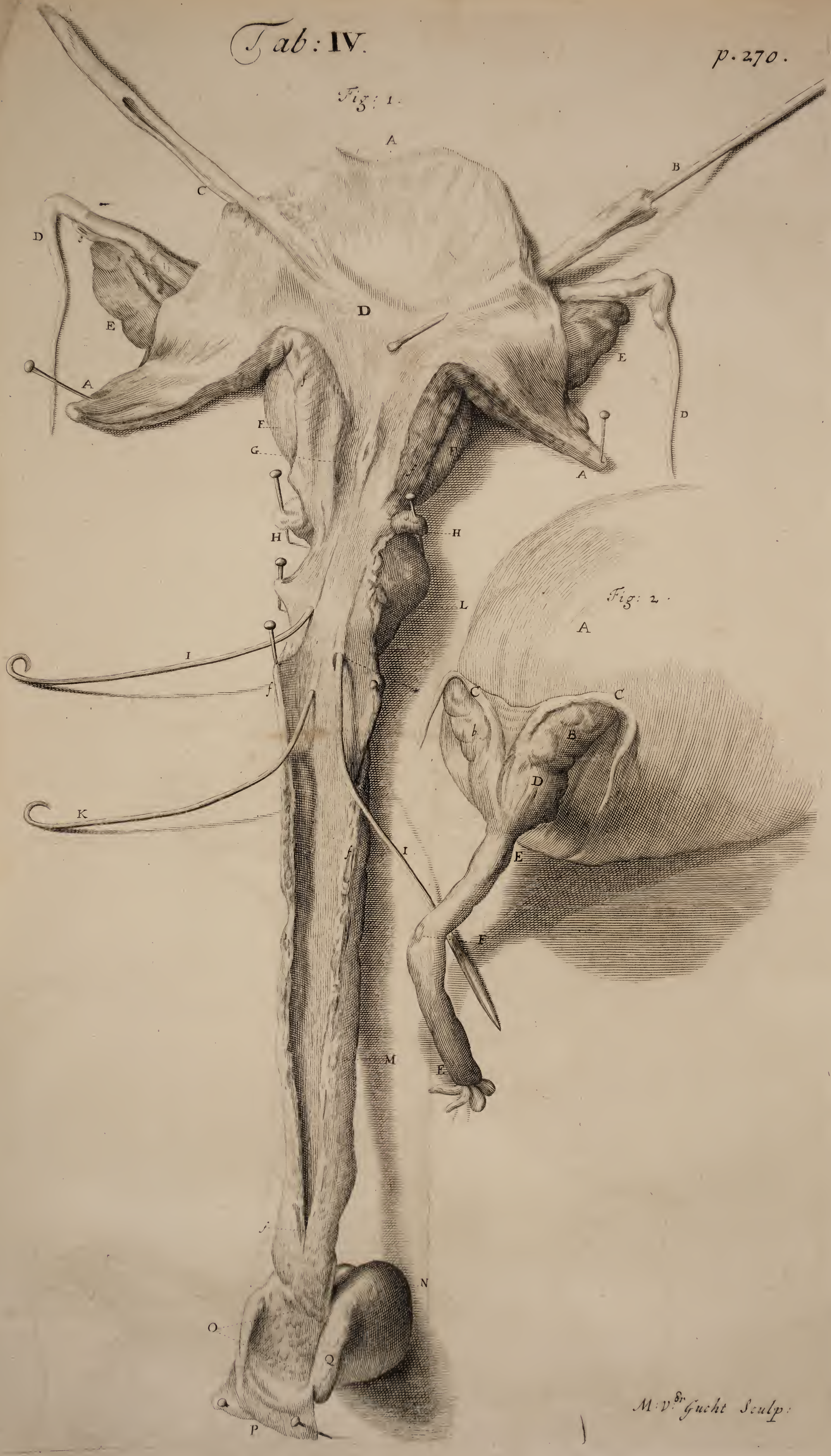

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Fig: 2.

M: V.dr Gucht Sculp:

good habit is contain'd, but which in theſe is waſted.

It is *in ſubſtance a groſs whitiſh Oyl*, and is indeed nothing but the *Oyly* part of the *Aliment*, ſeparated from the *Arterial* Blood by the *Adipoſe Glands*, and carry'd by peculiar *Ducts* to the *Membranous Cells*, from whence it is tranſmitted to the Blood again by the *Veins*. *What it is.*

The *Fat* of both kinds ſerves as a natural Balſam to preſerve the Body, and by mixing with, and enveloping the *Salts*, wherewith the *Blood* and *Serum* are highly ſaturated, keeps them from fretting and corroding the parts of the Body, through which they paſs. It is thought likewiſe, not without great probability, to make a conſiderable part of the nouriſhment of our Bodies; and accordingly we find that the groſſeſt, fatteſt Perſons falling, into an *Atrophy*, do in proceſs of time loſe all their *Fat*: Which is always quite expended in ſuch Caſes before the Diſeaſe becomes fatal. *Its Uſe.*

As it has its great and excellent uſes, ſo it is not without its inconveniences likewiſe. For, corpulent Perſons that abound with it, having their Blood too much charg'd, and all their Organs too much clogg'd with it, *Senſation* is damp'd, and they are apt to fall into a *Drouſie Lethargick* Condition, which ſometimes ends in ſudden Death. But the abundance of it ſeldom fails of being *Incommodities of too much* Fat.

ing attended with *Inactivity* and *Somnolency*, not only from the unweildineſs of an overgrown Body, nor from the ſtuffing of the Cavities of the *Thorax* and *Abdomen* alone, which is ſometimes ſo great as to obſtruct in ſome meaſure the motion and expanſion of the *Diaphragm* and *Lungs*, and ſo to produce a *Dyſpnæa* or difficulty of Breathing, and ſometimes an *Orthopnæa*, which ariſes from the preſſure of the over-charg'd *Viſcera* of the *Abdomen* upon the *Diaphragm:* But it is probable likewiſe that the quantity of *Fat* or *Oyly* Particles being return'd into the Blood, and engaging and implicating the more ſubtle active Parts, hinder thoſe Secretions from being made in the *Brain* in that quantity, which is neceſſary to a vigorous Animal Action.

Membrana Adipoſa. The MEMBRANA ADIPOSA, if there be really any ſuch *Membrane*, and that it be not rather the *exterior* Membrane of the *Carnoſa* or *Muſculorum communis*, which moſt Anatomiſts now agree it to be, is ſuppos'd to be the *Baſis* of the *Fat*, to which the Cells wherein it is contain'd are fix'd.

Parniculus Carnoſus. Next under the *Fat* lies the PANNICULUS CARNOSUS, which conſiſts of a double Membrane, the upper of which makes the *Membrana Adipoſa* before ſpoken of. The under, which is likewiſe call'd MEMBRANA MUSCULORUM COMMUNIS or MUSCULOSA, is in ſome places interwoven with pretty thick *Muſcular* Fibres, which are ſuppos'd to contract and corrugate the *Skin*: Tho' this action of it is viſible no where in a humane Body, except on the Forehead, or in ſome the whole Scalp. It is ſpread all over the Body, but very unequally in point of thickneſs, and has its *Arteries*, *Veins* and *Nerves*, from thoſe of the ſubjacent Parts.

The particular uſe of it is to ſupport, and be, as it were, a Baſis to the Globules of *Fat*. It ſerves in general as all other Membranes do to wrap, defend and connect the Parts together. Its different Names taken either from the Structure, or the Site, have occaſion'd ſome to multiply it, tho' thro' miſtake only. *Uſe.*

CHAP. V.

Of the Muſcles of the Abdomen.

SYLLABUS.

Muſculorum Abdominis
- *Obliqui*
  - *Deſcendentes*
  - *Aſcendentes*
- *Linea Alba*
- *Recti*
- *Pyramidales*
- *Tranſverſales*

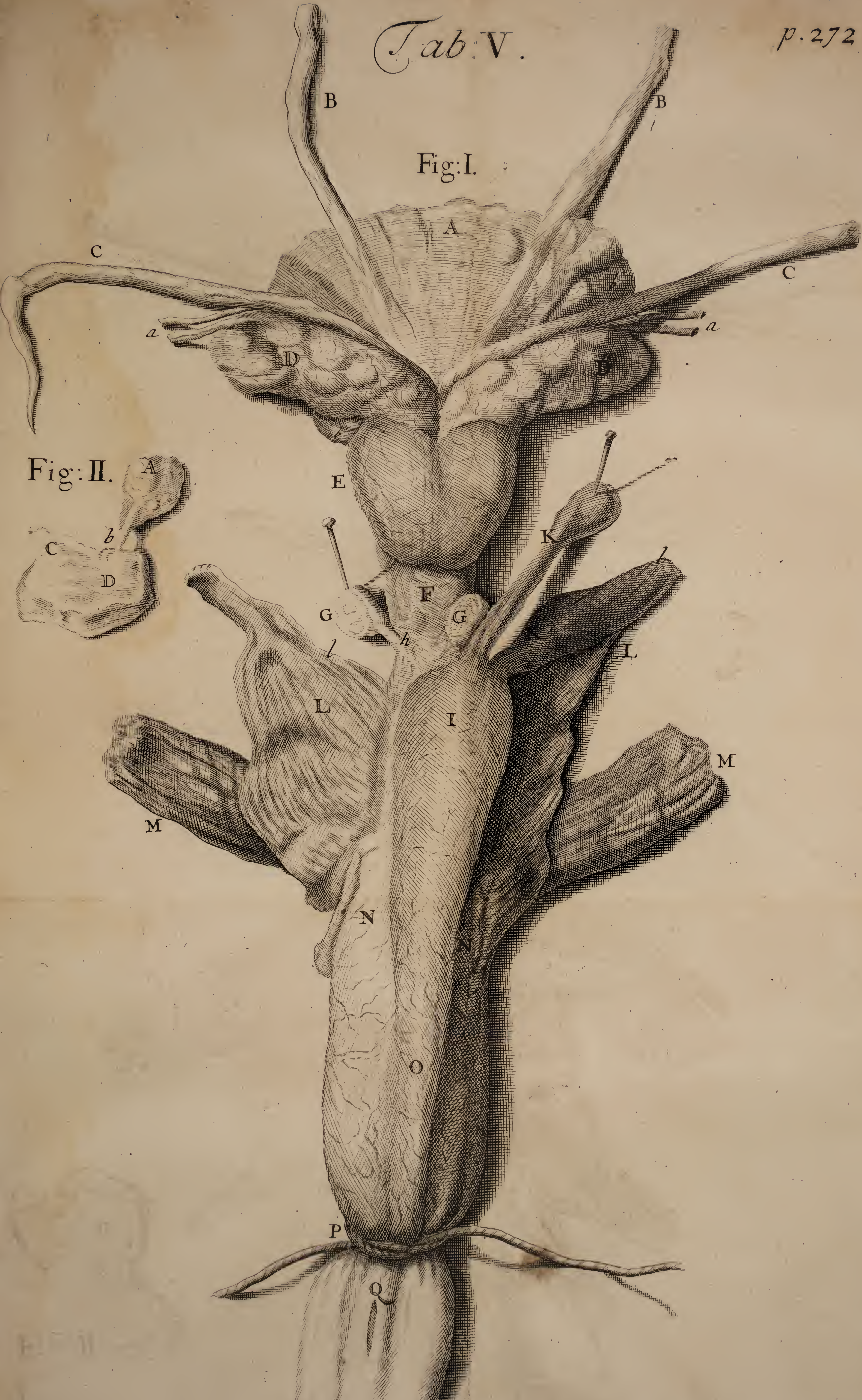
NExt after the *Membrana Muſculoſa* appear the MUSCLES of the *Abdomen*, of which there are Five Pair.

Obliquus Deſcendens. Of theſe the *outermoſt* are the OBLIQUE DESCENDING Pair, ſo call'd from the oblique Courſe of the Fibres, which run, from their riſe above, ſlanting downwards towards the fore Part.

This is a very broad Muſcle, covering each entirely one ſide of the *Abdomen*, and ſome part of the *Thorax*. It ariſes from the two laſt true Ribs, and five ſpurious ones, and is indented with the *Serratus Major Anticus* by five or ſix Digitations, each of which receives a Nerve from the Interſtices of the Rib. It ſprings likewiſe from

Tab: V.

p. 272.



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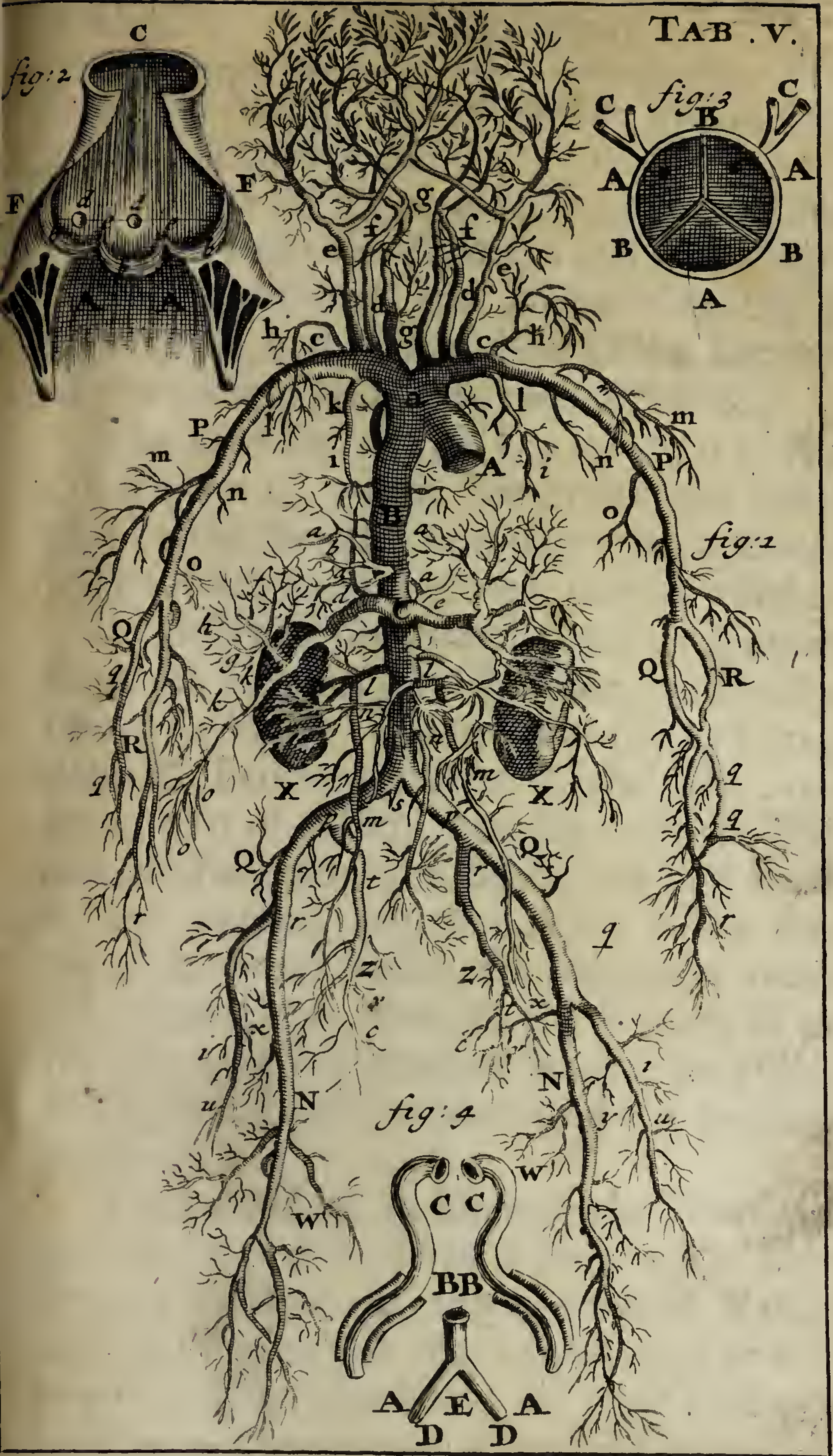
TAB. V.



from the Margin of the *Ilium*; and ends in a broad Tendon in the

LINEA ALBA, which is a white Line, that runs from the *Cartilago enſiformis* to the *Os pubis*, dividing the *Abdomen* exactly in the middle, and is form'd out of the Tendons of the *Oblique* and *Tranſverſe* Muſcles. *Linea Alba.*

The next Pair is the OBLIQUUS ASCENDENS, which lies under the lower part of the former, running with a Courſe juſt contrary from the lower part upwards. *Obliquus Aſcendens.*

Its fleſhy Fibres have their Origination from the Edge of the *Os Ilium*, and end at the *Coſtæ Nothæ*: It terminates with a large double Tendon in the *Linea Alba*, the upper part of which ramping over the *Muſculus rectus*, and the other creeping under it, and joyning together at the *Linea Alba*, do as it were ſheath the *Muſculus rectus*. Tho' ſometimes towards the bottom of the Muſcle this Duplicature is not ſo viſible, but begins about the Navel, and ſo proceeds upwards.

Theſe Muſcles, as likewiſe the *Tranſverſe*, are perforated in Men near the *Os pubis*, for the Paſſage of the *Spermatick* Veſſels, and in Women for the *Ligamenta Uteri rotunda*. Thro' the lower of theſe Perforations in a Rupture or Dilatation of the *Peritonæum* part of the Inteſtines ſometimes ſlip, and make that Tumour which is call'd a *Bubonocele* or Inguinal Rupture.

Rectus. The next is the MUSCULUS RECTUS, ſo call'd, becauſe its Fibres run ſtrait along the Belly from the *Sternum* and *Cartilages* of the *Ribs* to the *Os pubis.*

The Belly or *Venter* of this Muſcle is diſtinguiſh'd by three, ſometimes four Tendinous Lines or Inſcriptions, according to the Number of which ſome have reckon'd it ſo many ſeveral Muſcles: Others as a Muſcle of ſo many Bellies. They have been apt likewiſe to Diſpute which was the *Head*, and which the *Tail* of this Muſcle, which being a dry Speculation of no great uſe, I ſhall not trouble the Reader with any other Deciſion, than that he may reckon either of them indifferently *Head* or *Tail.*

Pyramidalis. After theſe comes the PYRAMIDALIS, which being but a ſmall Muſcle, tho' it lies upon the lower part of the *Rectus*, is uſually taken notice of after it, becauſe till the *Rectus* is rais'd, it is not ſo diſtinctly apparent.

It has its Name from its Figure, and its Origin from the ſuperior and inferior Margin of the *Os pubis*, with a pretty broad fleſhy Head, from whence it riſes, and grows gradually narrow till it ends in a ſmall, almoſt round Tendon, in the *Linea Alba*, ſometimes almoſt at the Navel.

This is ſometimes a ſingle Muſcle, and in ſome Subjects not found at all: But where it is ſolitary, it is generally found (as ſome Authors ſay) on the Left ſide.

Sometimes ſingle, ſometimes wanting.

The laſt is the TRANSVERSE, ſo call'd from the Courſe of its Fibres broadways croſs the *Abdomen.* It is the loweſt in Situation, and lies immediately upon the *Peritonæum*, which it ſticks cloſe to. It ariſes from the Tranſverſe Proceſſes of the *Vertebræ Lumbares*, from the lower Rib and interior Margin of the *Os Ilium*, and is inſerted with a broad Tendon like a Membrane into the *Linea Alba.*

Tranſverſalis.

All theſe Muſcles receive Branches of *Arteries* and *Veins* in the upper part from the *Mammaries*, which exert themſelves about the *Cartilago Xiphoides*, and below from *Epigaſtricks*, on each ſide from the *Intercoſtals*, and *Lumbals.*

Arteries *and* Veins.

Under thoſe Muſcles, but more particularly under the *Recti*, run the principal Branches of the *Mammary Arteries* and *Veins*, which latter have been obſerv'd to have very numerous Inoſculations with the *Epigaſtrick Veins*, of which *Verheyen* tells us, that he obſerv'd ſome Hundreds in a Dog. Under the *Tranſverſe* and *Oblique* run the *Intercoſtals* and *Lumbals* in moſt plenty, tho' 'tis probable all of them are ſerv'd by each, unleſs perhaps the *Pyramidals.*

Nerves. They have their *Nerves* from the *Intercoſtals* and *Lumbals*, which uſually bear the Blood Veſſels company.

Uſe. Theſe *Muſcles* ſerve not only as a Wall and Defence to the *Viſcera*, contain'd in the *Abdomen*: But likewiſe by their Contraction to ſtreighten the Cavity of the *Abdomen*, and by that means to promote the deſcent of their Contents thro' the *Inteſtines*, and to force it into the *Lacteals*; and to ſerve as Antagoniſts to the *Sphincter*, *Ani* and *Veſicæ*, and forcibly expel the Excrements of thoſe Parts, and likewiſe of the *Fœtus* in Parturition. They are alſo inſtrumental towards *Exſpiration*, by drawing down the Ribs, and upon this account are to be look'd upon as aſſiſtant Antagoniſts to the *Intercoſtals*, and other Muſcles that promote *Inſpiration*. They are likewiſe the chief, if not only, Organs or Inſtruments of *Vomition*, which Action is vulgarly, tho' falſly imputed to the Stomach, of which more largely hereafter.

Tab: VI.

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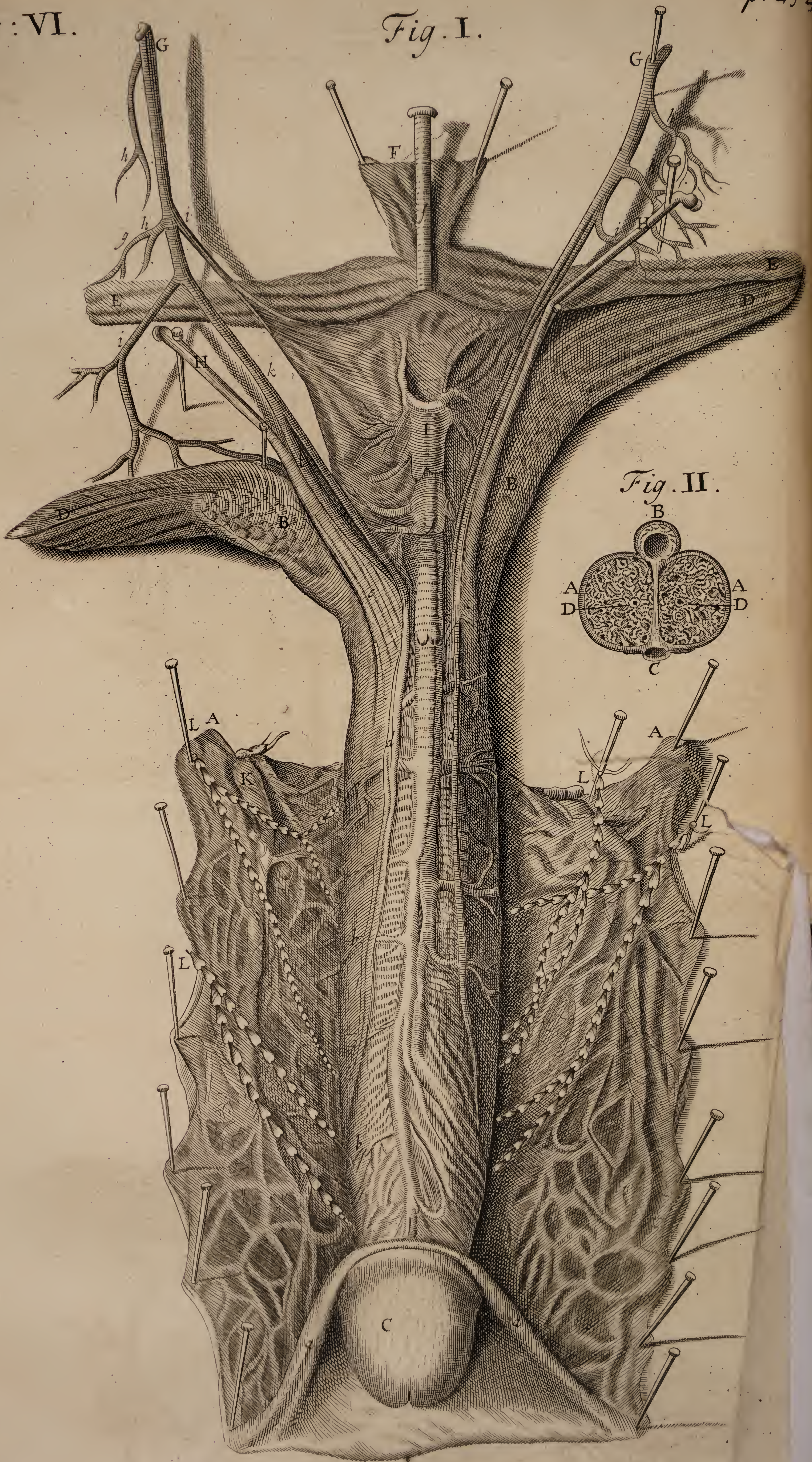
Fig. I.

Fig. II.



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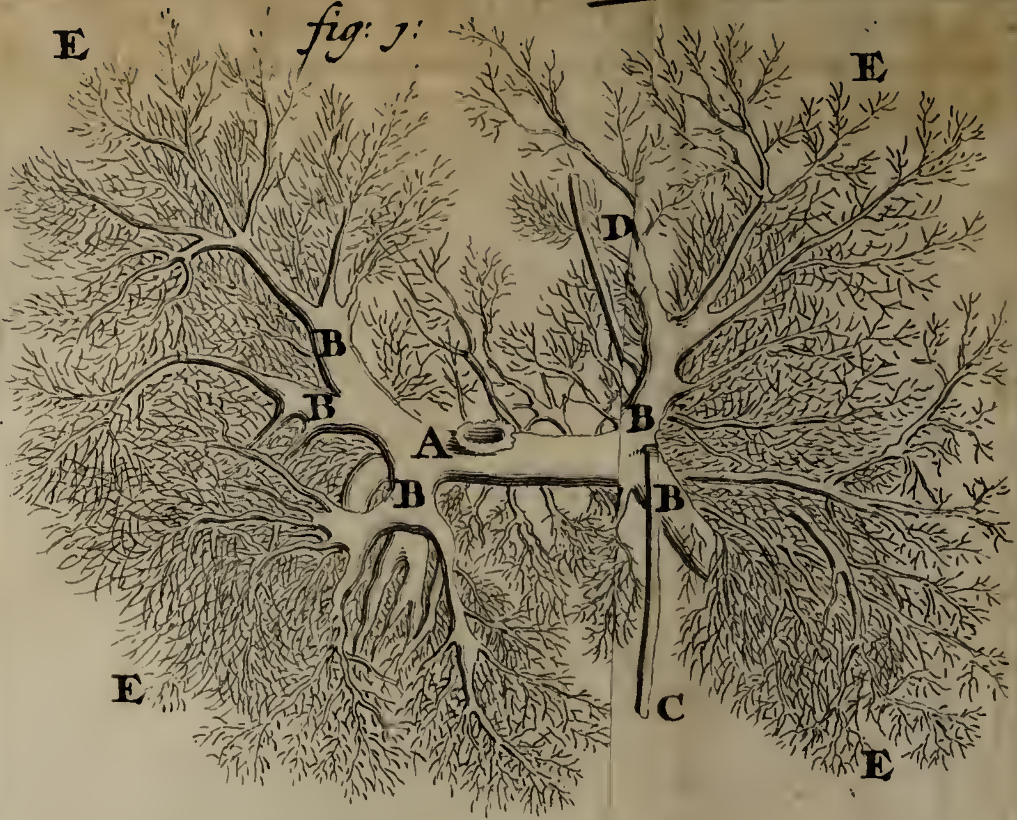

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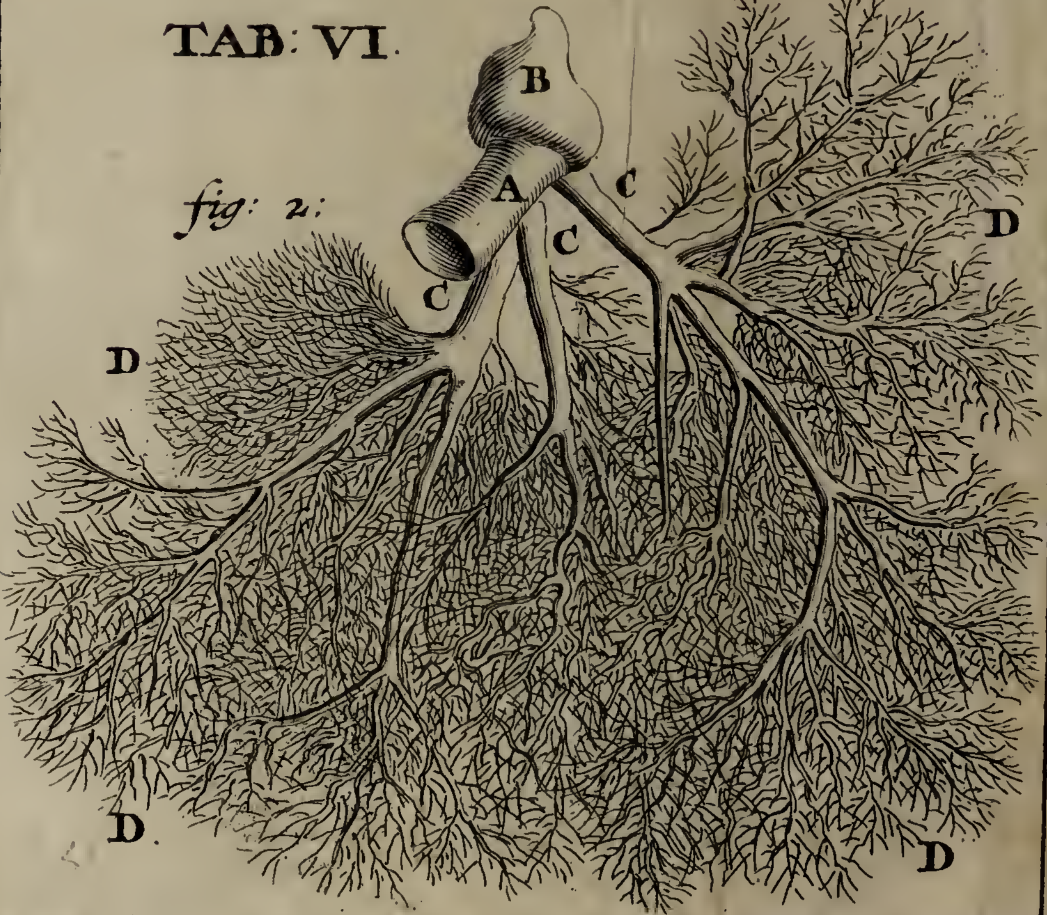

CHAP. VI.

Of the Peritonæum

SYLLABUS.

Notabilium in

Peritonæo
- *Figura*
- *Duplicatura*
- *Superſicies*
  - *Externa*
  - *Interna*
- *Glandulæ*
- *Connexio*
- *Ligamentum*
  - *Suſpenſorium*
  - *Hepatis*
- *Proceſſus*
- *Involucrum*
  - *Ligamenti rotundi Vteri*
- *Arteriæ*
- *Venæ*
- *Nervi*
- *Lymphæductus*
- *Vſus*
- *Morbi*

THE *Muſcles* of the *Abdomen* remov'd, the PERITONÆUM diſplays itſelf, which is a *thin*, *ſoft*, *ſmooth Membrane*, *covering and containing all the Viſcera of the lower Belly.* *Peritonæum.*

Figure. Its Figure in the natural State anſwers that of the lower Belly, and makes a kind of irregular Oval.

Duplicity. It is every where double, but more plainly ſo from the *Navel* to the *Os Pubis*: Where likewiſe in Women it is thicker for the conveniency of Diſtention in the time of Geſtation.

External Surface. Its *External* Surface is ſomewhat rough and fibrous from its Connection with the Muſcles: But the *Internal* is exactly ſmooth, and lin'd with an unctuous Humour (to facilitate the ſliding of the *Inteſtines* along it) which is ſeparated by a Number of ſmall *Glands.* Glands, which in Hydropical Bodies grow larger and more viſible, as the Membranes themſelves do likewiſe thicker.

Connexion. It is connected on the outſide to the *Tranſverſe* Muſcles of the *Abdomen*, and *Linea Alba*, below to the *Os Pubis* and *Iſchium*, on the ſide to the *Os Ilii*, behind to the *Os Sacrum* and *Vertebræ Lumbares*, eſpecially the firſt and third. From which it is ſaid by many to have its Origin, and where likewiſe the Duplicature is again very viſible, not only upon the account of its remarkable thickneſs, but from its ſpontaneous parting to receive the *Kidnies* betwixt the *Laminæ*. It is alſo reflected from the inferiour Surface of the *Diaphragm* to the Superiour, or Convex Surface of the *Liver*, which it ſuſpends, and this part of *Ligamentum Suſpenſorium Hepatis.*

it is call'd *Ligamentum Suſpenſorium Hepatis.*

The Exterior Coat has two Proceſſes, in Men falling down into the *Scrotum*, and wrapping up the *Spermatick* Veſſels, where they are likewiſe dilated, and make the *Tunica Vaginalis* of the *Teſtes*. In Women they form an *Involucrum* for the *Round Ligament* of the Womb. Ignorant Surgeons, not knowing preciſely where theſe Proceſſes paſs the Perforations of the *Obliqui Deſcendentes*, ſometimes miſtake Ruptures for Tumours of another kind, and attempt Suppurations, that might be fatal, if proſecuted: And ſometimes *Vice Verſa*, put Truſſes upon Apoſtemations, that ought to be open'd.

Proceſſus Externi.

Involucrum Ligamentum rotundi Uteri.

It receives *Arteries* and *Veins* in the upper part from the *Mammariæ* and *Diaphragmaticæ*: In the lower from the *Epigaſtricæ* and *Sacræ*: And on each ſide from the *Lumbares.*

Arteries *and* Veins.

The *Nerves* come out of the *Os Sacrum*, and the Loyns.

Nerves.

Olaus Rudbeck pretends to have diſcover'd *Lymphaticks* in it, which are ſeldom mention'd by Authors, becauſe ſeldom viſible, but in Hydropical Caſes, and therefore not often ſeen. In Morbid Caſes great quantities of *Serum* have often been found between the Duplicatures of this Membrane, when there has been none beneath it

Lymphaticks.

it in the Cavity of the *Abdomen.* This is the true *Tympany*, and is frequent in Women, whoſe *Ovaria* are probably in ſuch Caſes firſt affected, at leaſt they are then ſcarce ever unaffected, tho' all other Parts be ſound.

Uſe.

The Uſe appears to be Simple, to contain and keep in their place the *Viſcera* of the *Abdomen*, which is ſo manifeſt, that, whenever the *Peritonæum* happens to be broken, or extraordinarily dilated, ſome of them are very apt to fall out of their place, and to form thoſe ſorts of Tumours, which are call'd from the Parts diſplac'd *Enterocele* and *Epiplocele:* And thoſe are again divided according to the Parts they fall upon, as a Rupture of the *Guts* falling upon the *Navel* is call'd *Omphalocele*, which is an Accident that happens frequently to Children, ſometimes to Women upon hard Labours; and is often ſeen in Dogs, who from the Horizontal poſition of their Bodies have a greater weight, and bearing of the *Inteſtines* upon that part than any other of their Body. The next is the *Bubonocele*, which is the falling down of the Inteſtines thro' the Perforation of the *Muſculus Obliquus Deſcendens.* In the *Scrotum* ſuch a deſcent of the *Inteſtines*, or *Omentum* being the moſt uſual kind of Rupture, it is call'd *Enterocele*, or *Epiplocele*, or from both together *Entero-Epiplocele.*

Several kinds of Ruptures.

Omphalocele.

Bubonocele.

Enterocele Epiplocele.

Entero-Epiplocele.

All theſe ſorts of Ruptures are occaſion'd by Blows, violent Concuſſions, overſtretching in Vomiting, hard Labour, or Wind, from which latter Cauſe it is that Ruptures are ſo frequent in Children, and ſo eaſily help'd by timely Care.

There are other Tumours, which from their outward appearance are alſo call'd *Ruptures* vulgarly. But theſe, relating to the *Common* and *Proper Teguments* of the *Teſtes*, ſhall be ſpoken of elſewhere.

CHAP. VII.

A View of the Viſcera *of the Abdomen in their* Natural Situation, *&c.*

SYLLABUS.

Viſcerum Abdominis in Situ ſpectandorum
amoto

Periotenæo

- *Funiculus Umbilicalis*
  - *Arteriæ duæ*
  - *Venæ duæ*
  - *Urachus*
- *Omentum*
- *Inteſtina*
- *Ventriculus*
- *Meſenterium*
- *Lien*
- *Hepar*
- *Renes*
- *Veſica Urinaria*

THE *Peritonæum* remov'd gives us the view of the Parts in their Natural Situation, as they lie diſpos'd one among another.

Funiculus Umbilicalis. The firſt, that appears, is the FUNICULUS UMBILICALIS, of which care muſt be taken, that it be not cut in dividing the *Linea Alba*, which it perforates. *Of what conſiſting.* It conſiſts of three ſorts of Veſſels, a *Vein*, two

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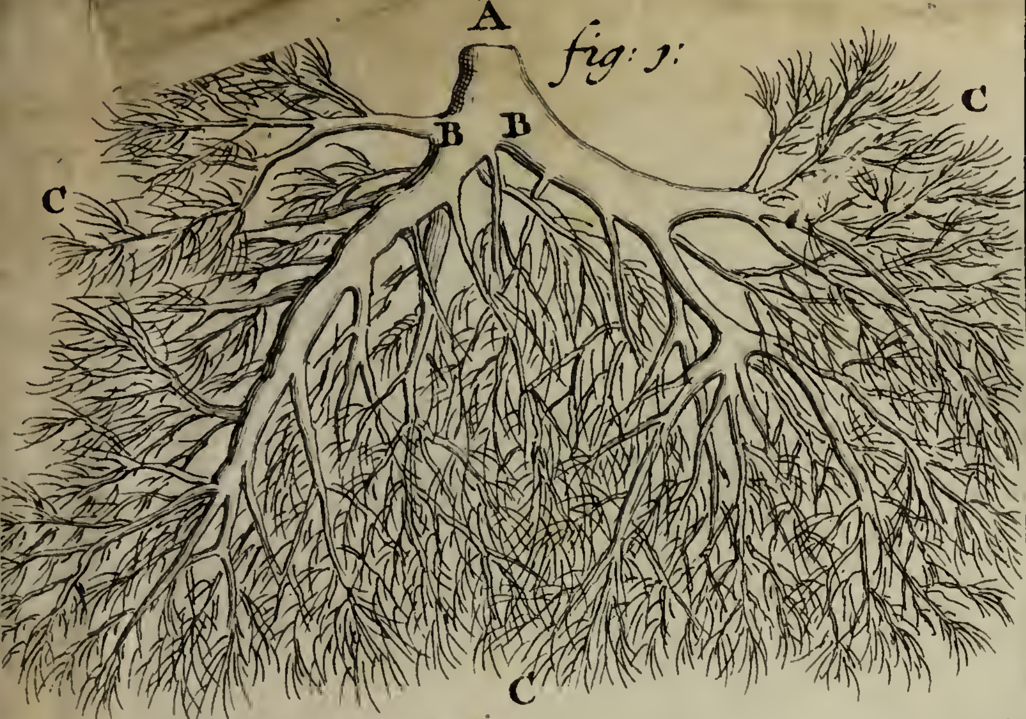

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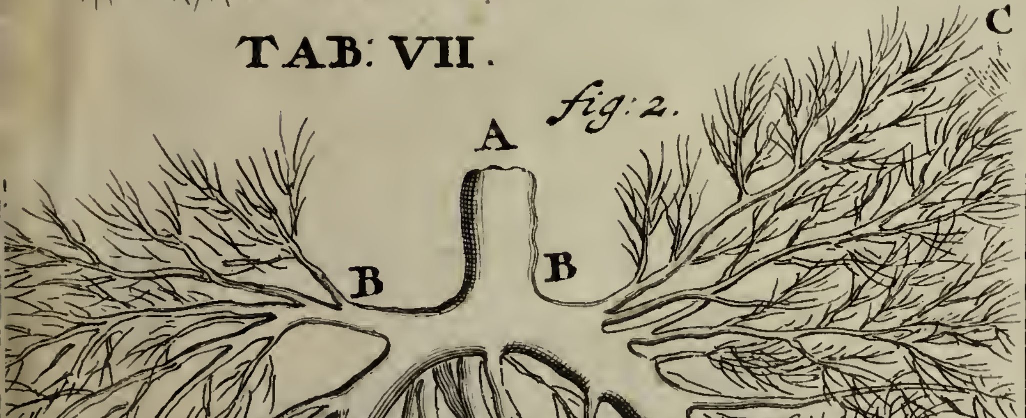

Tab:VII.

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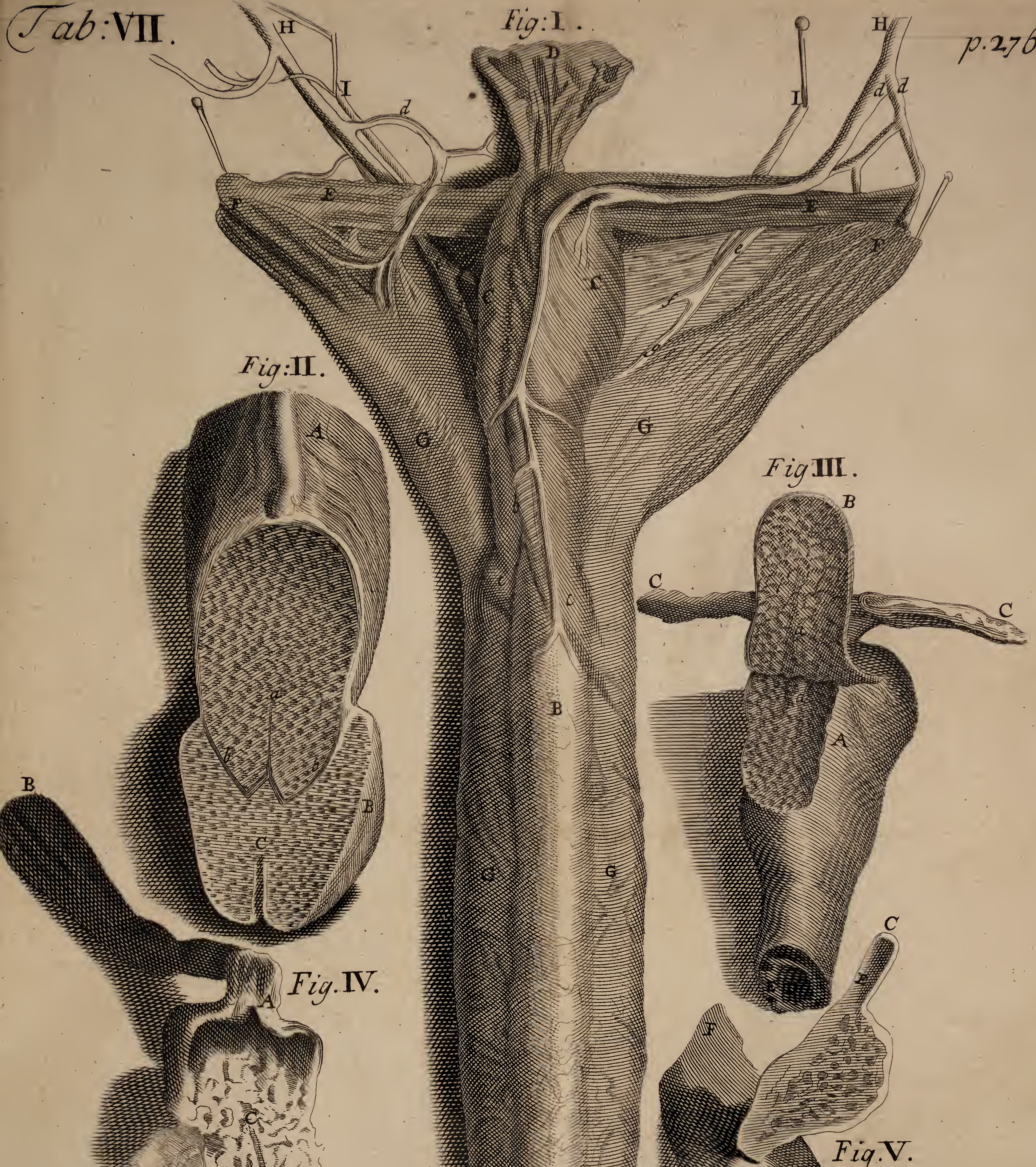


Fig:I.

Fig:II.

Fig III.

Fig. IV.

Fig. V.

two *Arteries*, and the *Vrachus*, which ſoon after the Birth dry up, and become *Ligaments.*

The next to be conſider'd is the OMENTUM, which is ſpread almoſt all over the *Inteſtines*, and covers the ſuperior part of the *Abdomen.* *Omentum.*

The *Omentum* taken away, the INTESTINES are diſcover'd variouſly contorted and connected almoſt thro' their whole length to the *Meſentery:* The *Thick* ones lying uppermoſt, and the *Thin* underneath, and together filling the greateſt part of the *Vmbilical*, and *Hypogaſtrick Regions.* *Inteſtines.*

In the *Left Hypochondrium* immediately under the *Diaphragm* lies the STOMACH, which if it be empty, and the *Thorax* unopen'd, is ſcarce ſeen, unleſs it be forcibly elevated, and brought forwards. Ventriculus *or* Stomach.

On the Left Side of the *Stomach* lies the SPLEEN, which, unleſs bigger than ordinary, is quite hid by the *Stomach* and *Diaphragm*, and impending parts of the *Thorax*, and therefore muſt be drawn a little out of its *Natural Site* to be plainly ſeen, before the *Thorax* is open'd. *Lien Spleen.*

The LIVER is a very *bulky Viſcus:* But, becauſe the *Diaphragm* in dead *Bodies* is very much concave towards the *Abdomen*, even this too is almoſt hid by the *Diaphragm* and *Cartilages* of the *ſpurious Ribs:* So that it is hard to ſhew its Poſture likewiſe, 'till the *Tho-* *Hepar Liver.*

Thorax be open'd. Therefore to diſplay the contain'd Parts of this Region, either the *Thorax* with the *Diaphragm* muſt be forcibly lifted up, or the *Lungs* ſo ſtrongly inflated that the *Stomach* and *Liver* may be driven downwards. By the firſt way you ſee them as in violent *Expiration*; and by the latter as in the Act of ordinary *Inſpiration*.

Renes *or* Kidnies.

The KIDNIES and VESICA URINARIA require ſomewhat more help to make them diſcover themſelves. On each ſide in the *Loins* lie the *Kidnies*, entirely hid, and cover'd by the ambient Parts, which muſt be remov'd by the Hand before they can be come at.

Veſica Urinaria *or* Bladder *of* Urine.

Lower yet in the *Pelvis* of the *Abdomen*, partly under the *Os Pubis* lies the BLADDER of URINE, which likewiſe needs ſome help, though not ſo much as the *Kidnies*, to have a ſight of it.

Confus'd Site of the Viſcera *occaſions frequent Errors in the* Diagnoſis *of Diſtempers.*

The confus'd Order, wherein divers of theſe Parts ſeemingly lie perplex'd and intermix'd with one another, has occaſion'd many Miſtakes concerning the Seat of Internal Abdominal Pains, in ſome of which a great deal of Judgment is requir'd to diſtinguiſh nicely: As between *Hypochondriacal*, *Colical*, *Nephritical* and *Lumbal Pains*. So likewiſe *Inflations* of the *Inteſtines*, particularly of the *Colon*, often

Pains *in this Region hard to be exactly diſcriminated* often impoſe upon *Phyſicians* for indurated *Spleens* and *Scirrhous Livers*, only by ſeeming to point by ſome extraordinary *Intumeſcence* and *Hardneſs* at the Regions where thoſe *Viſcera* lie.

TAB. I.

FIG. I.

PArt of the *Cuticula* rais'd from the *true Skin*, as it appears by a magnifying Glaſs after it has lain ten Days in common Water.

A The *Inferiour* or *Internal* Surface of the *Cuticula* next the *Cutis*.

B The *exteriour* Surface of the *Cutis* next the *Cuticula*.

a a The *Hairs*, which are common to the whole Body, and were rais'd with the *Cuticula*.

b b Their *Bulbous* Roots, as they appear'd when drawn out of the *Foramina*, that received them in the *Cutis*.

c c The *Foramina*, or holes of the *Skin*, whence the Roots of the Hairs were extracted.

FIG. II.

THE *Abdomen* open'd to ſhew its *Viſcera* in their Natural Situation. In this ſubject the *Skin* and *Fat* were taken off the upper part of the Body and Arms, to ſhew their external Muſcles: The Right Arm lying in that Action call'd *Pronation*; the Left in *Supination*.

A A, The *Internal* Surface of the *Skin* covered with the *Fat*.

B B, The *Internal* Surface of the *Peritonæum*, as it appears, when the Muſcles with it are divided croſsways at the Navel, and their four corners turn'd out to ſhew the Parts contain'd.

a The *Navel* cut out, and left to ſhew the *Ligaments* in Adults call'd

b The *Vrachus*.

c c The two *Vmbilical Arteries* turn'd down.

C The *Vena Vmbilicalis* alſo chang'd to a Ligament, here turn'd up, where part of the *Ligamentum ſuſpenſorium Hepatis* may be alſo ſeen ♈.

D Part of the *Convex* Surface of the *Liver in ſitu.*

E Part of the *Stomach* alſo ſeen in this poſition.

F F F The *Omentum* as it uſually appears lying on the Guts. Here its Blood Veſſels may be ſeen that paſs from the Stomach to it, call'd the *Arteria* and *Vena Gaſtrica Epiploica dextra* and *ſiniſtra.*

G, Some of the *ſmall Guts* not cover'd by the *Omentum*, as they lie on the beginning of the *Colon* in the right *Ilium.*

d Part of the *Muſculus Cremaſter*, as it deſcends on the proceſs of the *Peritonæum*, that incloſes the *Spermatick* Veſſels in their progreſs to the *Teſtes.*

e, The *Bladder* of *Urine*, diſtended with Wind to make it appear in this Poſition.

f, *Os Pubis.*

g, The *Enſiform Cartilage.*

H H, The two *Pectoral* Muſcles in *ſitu.*

h, *Os Pectoris* or *Sternum.*

I, *Muſculus Quadratus Colli* or *Platuſma Myoides* covering

i, The *Maſtoideus*,

k, The *Maſſeter*, and

l, The *Parotid Gland.*

K Part of the *Clavicula.*

p, Part of the *Muſculus Elevator Scapulæ*, and

q, A portion of the *Cucullaris*, covered by the *Quadratus Colli* alſo.

m, The *Muſculus Zygomaticus*, and

n, The *Temporalis.*

o, *Os Jugale*, and *Muſculus Orbicularis Palpebrarum.*

L *Muſculus Deltoides.*

M, *Gemellus.*

N, *Brachiæus internus.*

O O, Parts of the *Serratus Major Anticus*, by which may be ſeen (in the Shade) a portion of the *Latiſſimus Dorſi.*

P, The *Biceps* in both Arms.

Q Q, *Radialis extenſor Carpi.*

R, *Supinator Radii Longus* in both Arms.

S, The *Extenders* of the *Thumb.*

T, *Extenſor Digitorum Communis.*

V, *Extenſor Minimi Digiti.*

W, *Anconæus.*

X, *Ulnaris Extenſor.*

Y, Part of the *Ulnaris Flexor Carpi.*

Z, *Abductor Minimi Digiti.*

r, The *Interoſſei*, as they appear on the Back of the Hand.

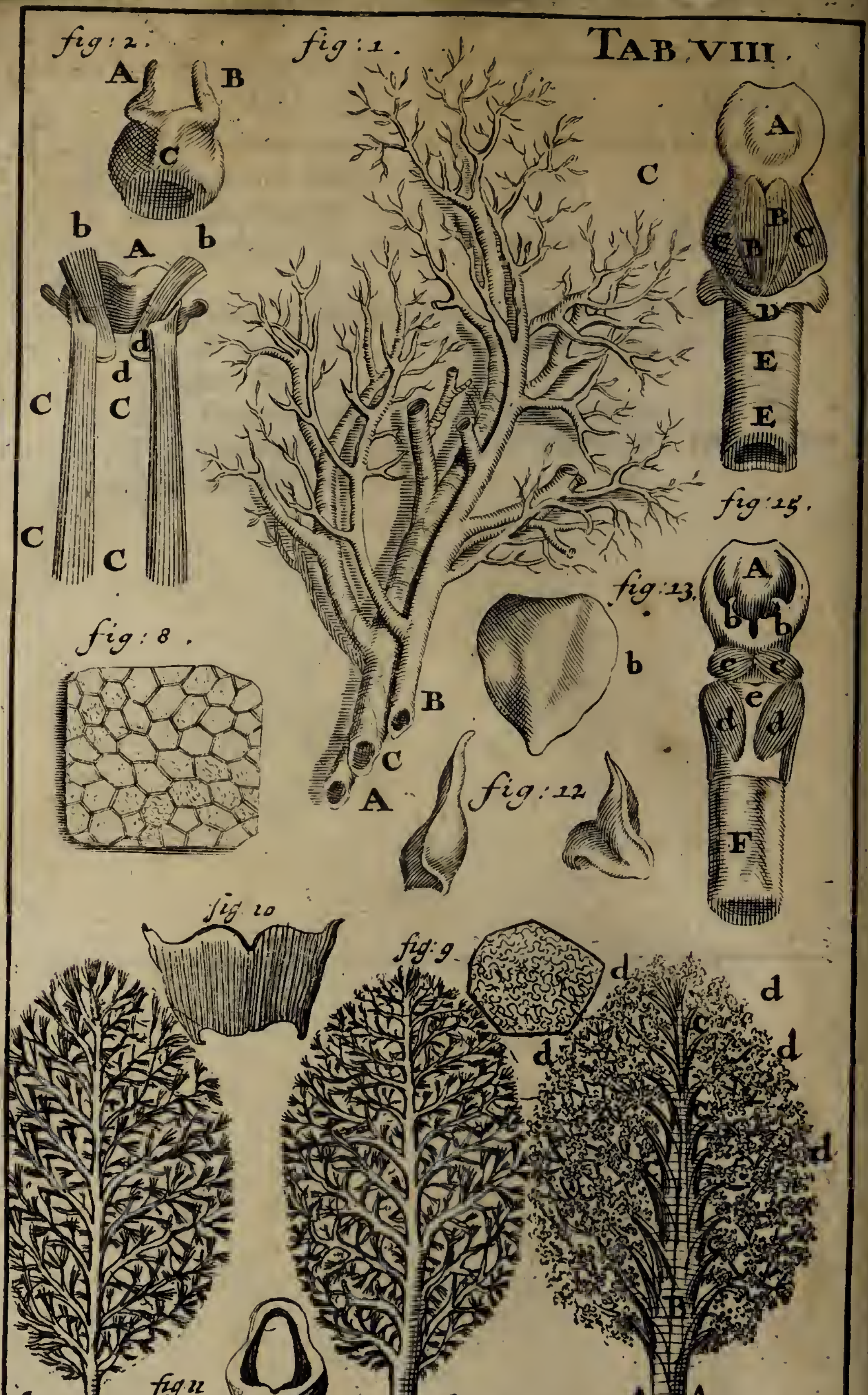
s, The *Flexor Carpi Radialis* in the Left Arm.

t, Part of the *Tendon* of the *Palmaris longus.*

u, *Abductor Pollicis.*

w, The *Tendon* of the *Flexor Pollicis longus.*

x, The *Tendons* of the *Muſculi Flexores Digitorum Perforans* and *Perforatus.*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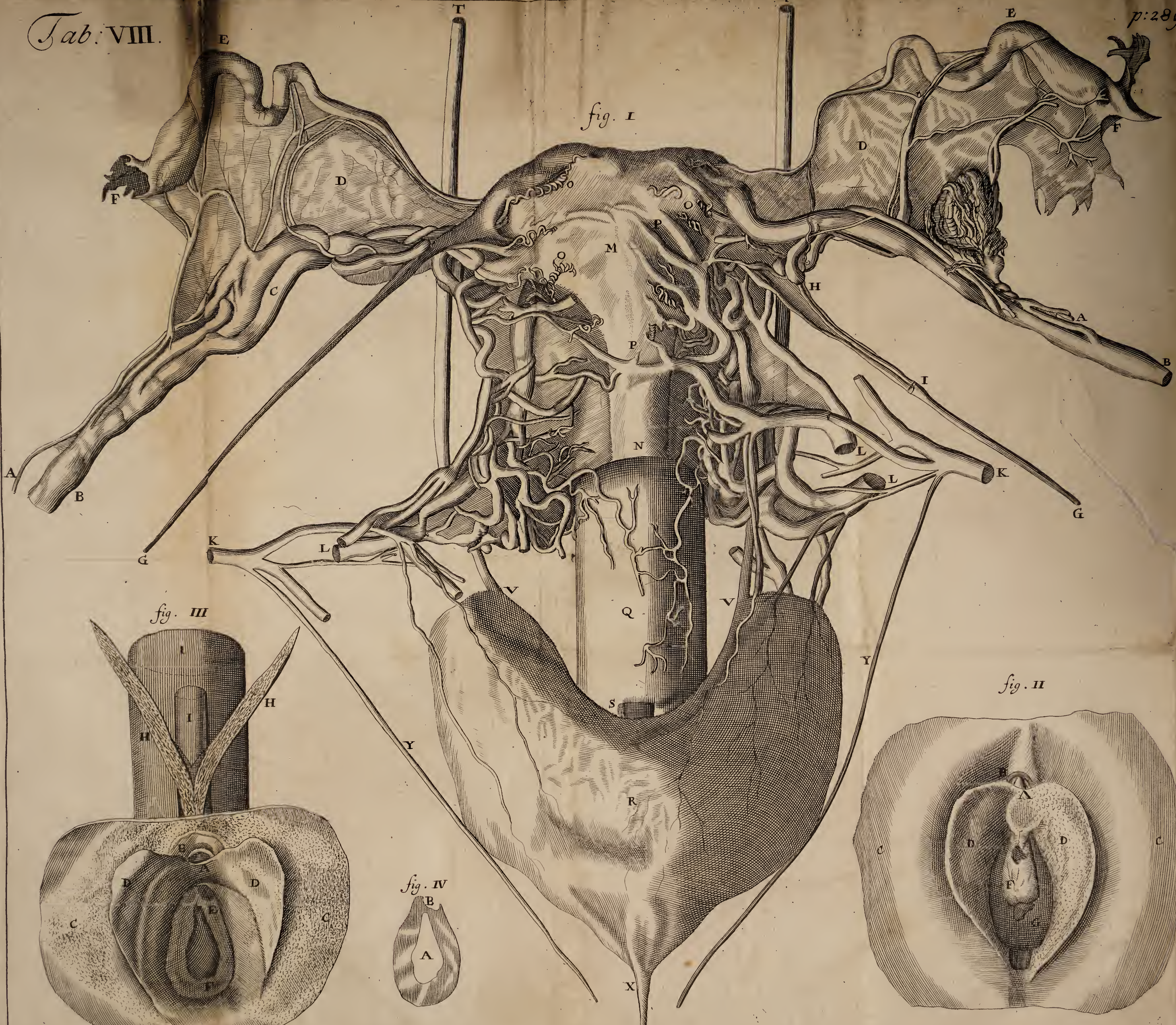
Tab: VIII.



CHAP. VIII.

Of the Omentum, *or* Caul.

SYLLABUS.

Eorum quæ in conſpectum veniunt in

Omento
- *Duplicatura*
- *Vaſa Adipoſa*
- *Areolæ*
- *Cavitas*
- *Figura*
- *Pondus*
- *Capacitas*
- *Vaſa ſanguifera*
- *Cellulæ Adipoſæ*
- *Connexio*
- *Adeps*
- *Uſus.*

Tab. I. Fig. II.

Omentum. THE OMENTUM, EPIPLOON, *Rete* or *Reticulum* (for by all theſe Names it is variouſly call'd by Authors) is a membranous thin Part, connected at its upper Extremity chiefly to the bottom of the *Stomach*, to the concave Part of the *Liver*, to the back ſide of the *Duodenum*, to that part of the *Colon*, that lies under the *Stomach*, to the *Back*, and to the *Spleen*. It is ſpread immediately over the Inteſtines, having its other Extremity looſe.

Duplicature, *or* Leaves.

It conſiſts of *Two* Membranes or Leaves betwixt, and on the Surface of which innumerable *Veins*, *Arteries*, *Nerves*, and

Vaſa Adipoſa.

VASA ADIPOSA, or *Fat* Veſſels, running variouſly croſs, and interſecting one another, divide it into a multitude of little

Areolæ.

AREOLÆ, reſembling the *Maſhes* of a fine *Net.* The *Fat* in its proper Ducts running along with the other Veſſels, and together with them, renders thoſe diviſions of the *Areolæ* obſcure, while the intermediate Spaces are fill'd with a tranſparent Membrane, full of ſmall Holes, ſo that the whole in ſhew ſeems to be a beautiful kind of Net.

Cavity.

Theſe Leaves form a conſiderable *Cavity* like a large Purſe or Sachel, into which, if a Blow-pipe be thruſt below the Stomach, it may be blown up to the capacity of a Gallon. Its bottom is faſten'd to the ſmall Guts. Tho' theſe Membranes be of a Texture too rare to retain the Flatus long, yet the Experiment ſuffices to ſhew the Continuation of the Trunks of the Blood Veſſels from the *Stomach*, *Duodenum*, *Colon* and *Vas Breve* into it. Some have made this *Sacculus* the Seat of divers Diſtempers, but I think without ſufficient Ground, except in Dropſies, and therefore ſhall not take notice of them here.

In ſeveral Subjects it is of an unequal Extent, in ſome not reaching beyond the

Navel, in others being large enough upon a Rupture of the *Peritonæum* to fall down into the *Scrotum.* *Hippocrates* lays it down as one of the occaſions of Sterility in Women, when being too Fat, it lies too heavy upon, and compreſſes the *Os Uteri.* Perhaps this Conjecture of his is founded upon his Obſervation, that *Barren* Women are apt to grow *Fat*, and that thoſe which are *Prolifick*, uſually grow *Fat*, when they have done Bearing, and ſo may aſcribe their ceaſing to Bear, to their growing *Fat*; whereas I ſhou'd rather impute their growing *Fat*, to their *ceaſing* to Bear.

Weight. The ordinary *Weight* of it is about half a Pound; tho' ſometimes it has been obſerv'd very thick and hard, and in Hydropical People to amount to ſeveral Pounds weight.

Extent *Veſſels.* Its *Arteries* come from the *Cæliac* and *Meſenteric*, and the *Veins* run to the *Porta*, eſpecially the *Splenic* Branch of it, and are call'd *Epiploicæ*, and ſome, which are common to the *Stomach* as well as the *Omentum*, are call'd *Gaſtro-epiploicæ.* Its Nerves come from the *Intercoſtals*, and are not large.

Cellulæ Adipoſæ. The *Fat* here, as in the *Membrana Adipoſa*, is either ſeparated into the LOCULI or ADIPOSE CELLS, and from thence deliver'd into the *Ductus Adipoſi*: Or elſe is brought by them to theſe *Adipoſe Cells.* *Doubt concerning the Ductus Adipoſi.* For the extream Fineneſs and Tranſparency of theſe Veſſels, as well as of their Liquor, renders it exceeding difficult to trace their Origin or Courſe: And indeed it remains ſomething doubtful, whether they be hollow and real Ducts or not, or whether they be only Fibres, ſuch as are obſerv'd in the *Spleen*, along which the liquid *Fat* does as it were drill its way, as the eaſieſt it can find.

Opinion of Malpighius *concerning 'em.*

The accurate *Malpighius*, the firſt nice Obſerver of this Part, and Diſcoverer of theſe Ducts (if ſuch they are) inclines to the former Opinion: And indeed it is hard to entertain any other. All that is certain concerning them, is, that they diſcharge themſelves, or terminate in little oily Globules of *Fat*, concerning the farther Uſe and Progreſs of which, much remains ſtill to be diſcover'd.

Other Doubts of Malpighius.

Concerning their Origin.

MALPIGHIUS himſelf ſtarts ſeveral ingenious Doubts, which he recommends to further Proſecution: *Firſt*, Whether theſe *Adipoſe Ducts* be not propagated from the Fibres which abound in the *Spleen*, or thoſe Fibres from them: One of which he is induc'd to ſuſpect from the Similitude of theſe Fibres to thoſe, which he finds in the *Omentum*, and from the Communication and Continuation of ſome Fibres, which he obſerves between them, whereas thoſe of the *Spleen* ſeem to have none with the *Blood Veſſels.*

His other Doubt is, whether there may not yet be any undiſcover'd Communication between the *Omentum* and the *Membrana Adipoſa:* And whether by means of its Connexion with the Back, its Veſſels may not be propagated into every Region of the Body by the Mediation of this Membrane, which is ſpread over it, and ſo be as it were the common Root of the *Fat* all over the Body.

Concerning their Propagation thro' the Body.

Neither is he more certain yet, whence this *Omentum* is ſupply'd, for beſides the *Spleen* before mention'd, *Malpighius* offers to our Conſideration two other Fountains, *viz.* the *Stomach* and the *Glands* of the Body. The firſt he ſuſpects upon the account of the Connexion of the *Omentum* with it, and the latter upon Obſervation, that they are generally accompany'd with *Fat*, and from the Taſte of them, which he thinks they are beholden to the *Fat* for.

Concerning the Source *of their* Fat.

But, as he does, ſo do I think this Matter deſerves a farther Inquiry, for I cannot think any of thoſe the real ſource of it, and muſt content my ſelf with deriving it from the Blood in general, without aſſigning the immediate Organs of its Separation.

Deſerving a farther Inquiry.

As *Anatomiſts* are hitherto deficient in aſſigning the true ſource of the *Fat*, ſo are they likewiſe in my Opinion about the Uſes of it.

Uſes of the Fat.

Retunding the Acrimony of the Salts.

Suppling and Lubrication.

Nouriſhment.

The firſt and principal Uſe of the *Fat* in general is to implicate and curb the Acrimony of the Salts of the Blood, which otherwiſe wou'd be apt to Fret and Corrode the Parts thro' which it paſſes, eſpecially thoſe which are Membranous and Veſiculous, and accordingly in *Lean* Perſons we obſerve, that they are more liable to *Catarrhs*, and other Diſtempers ariſing from Acrimonious *Serum.* It ſerves likewiſe to Anoint and Lubricate the ſeveral Parts, and to make them move Commodiouſly; And is likewiſe ſuſpected by many to ſerve as Nutriment to the Body, which Opinion is ſupported by the common Obſervation, that *Fat* Perſons grow *Lean* by long Abſtinence, and that ſome Animals, which in the Summer Seaſon feed Plentifully, and grow *Fat*, will at the approach of Winter withdraw and hide themſelves, and Live all that Seaſon without Food, and appear again in the warm Weather *Lean* and Shrunk, which is an Argument that the *Fat* which they gather in the Summer-Seaſon, ſerves 'em for Nutriment in the Winter. This Opinion is countenanc'd by other Obſervations, that moſt of thoſe Animals retire very *Fat*, eſpecially the *Tortoiſe*, which has peculiar Veſſels containing an extraordinary Stock of *Fat* along the *Inteſtines*, which probably ſerves for his Winter's Suſtenance. This Uſe ſuppoſes a return of it into the Blood, which is very probable, tho' the particular way of its Paſſage is not yet diſcover'd.

Serves as a Natural Balſam *to preſerve the Body.*

I am of Opinion likewiſe, that it ſerves as a ſort of a *Natural Balſam* to preſerve the other Parts from Corruption. For as all *Oily* Bodies are more particularly Exempted from Putrefaction than others, ſo in an Animal Body all the other Parts are ſubject to ſpeedy Putrefaction, the *Fat* only well ſeparated from the reſt, will keep without Putrefying. It may perhaps be objected, that after Death Corpulent Bodies Purge moſt, and Putrefie ſooneſt: But that does not ariſe from the quantity of *Fat*, but from the abundance of mixt Humours, which are apt to Ferment and Putrifie, and of which emaciated Bodies are almoſt deſtitute, and therefore not liable ſo ſoon to Putrifie.

Uſe of the Omentum.

The particular *Uſe* of the *Omentum*, with regard to its Situation, is to aſſiſt the *Periſtaltick* motion of the *Inteſtines* by Lubricating them with its *Oily* Subſtance, which tranſudes thro' its Pores, and by following them in their doublings and windings, and thereby ſerving them as a ſoft Bolſter to ſlide upon, and, by their filling up the Hollows, preventing their being too much diſtended with *Flatulencies*, yet giving way to 'em when repleted with Aliment. It may have ſome further Effect by cheriſhing the *Inteſtines* with its Warmth; but that, tho' it has been fancy'd to be its primary Uſe, cannot be much, becauſe it is not naturally warmer than the Inteſtines themſelves, and their comfort of that kind muſt be mutual.

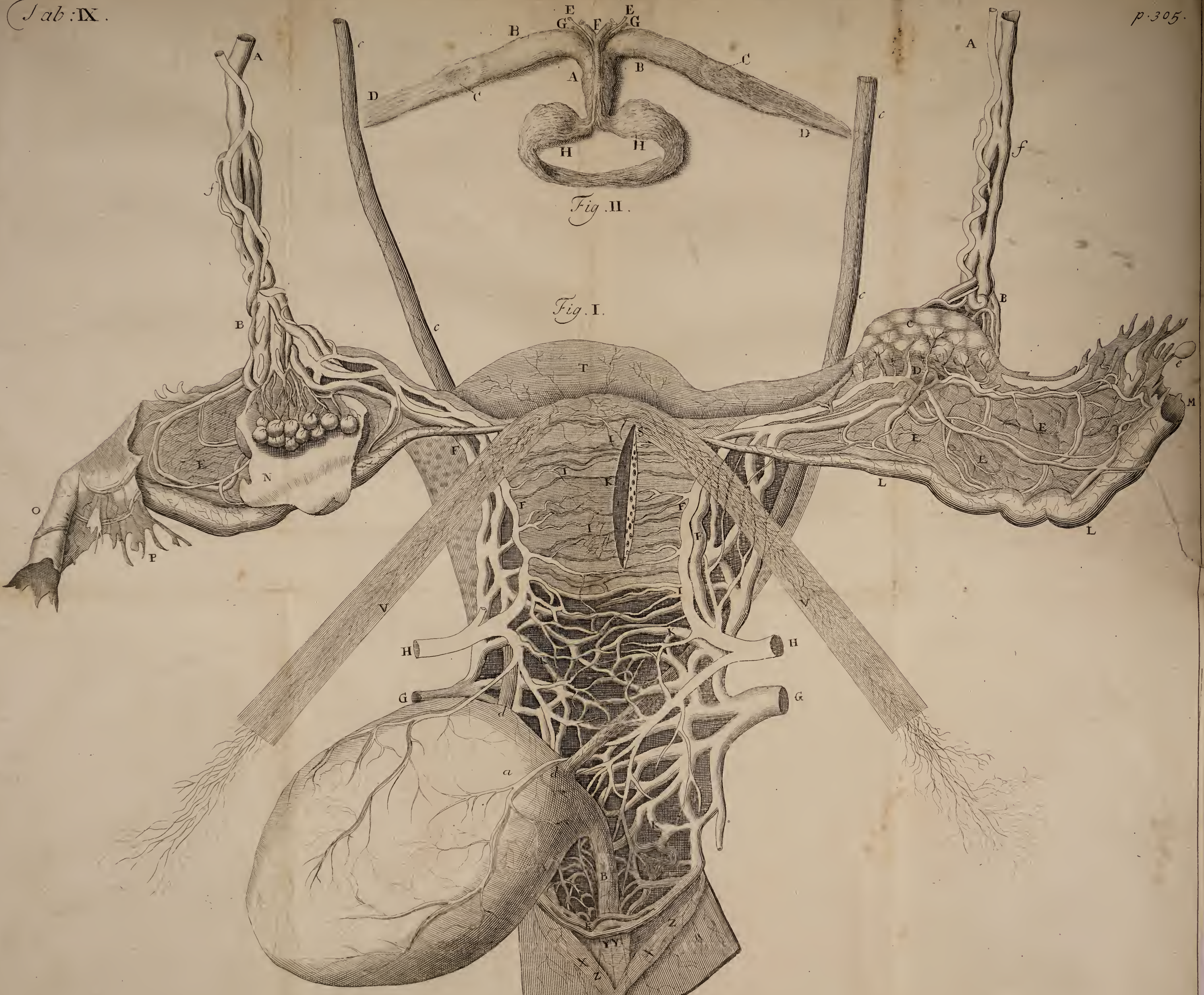

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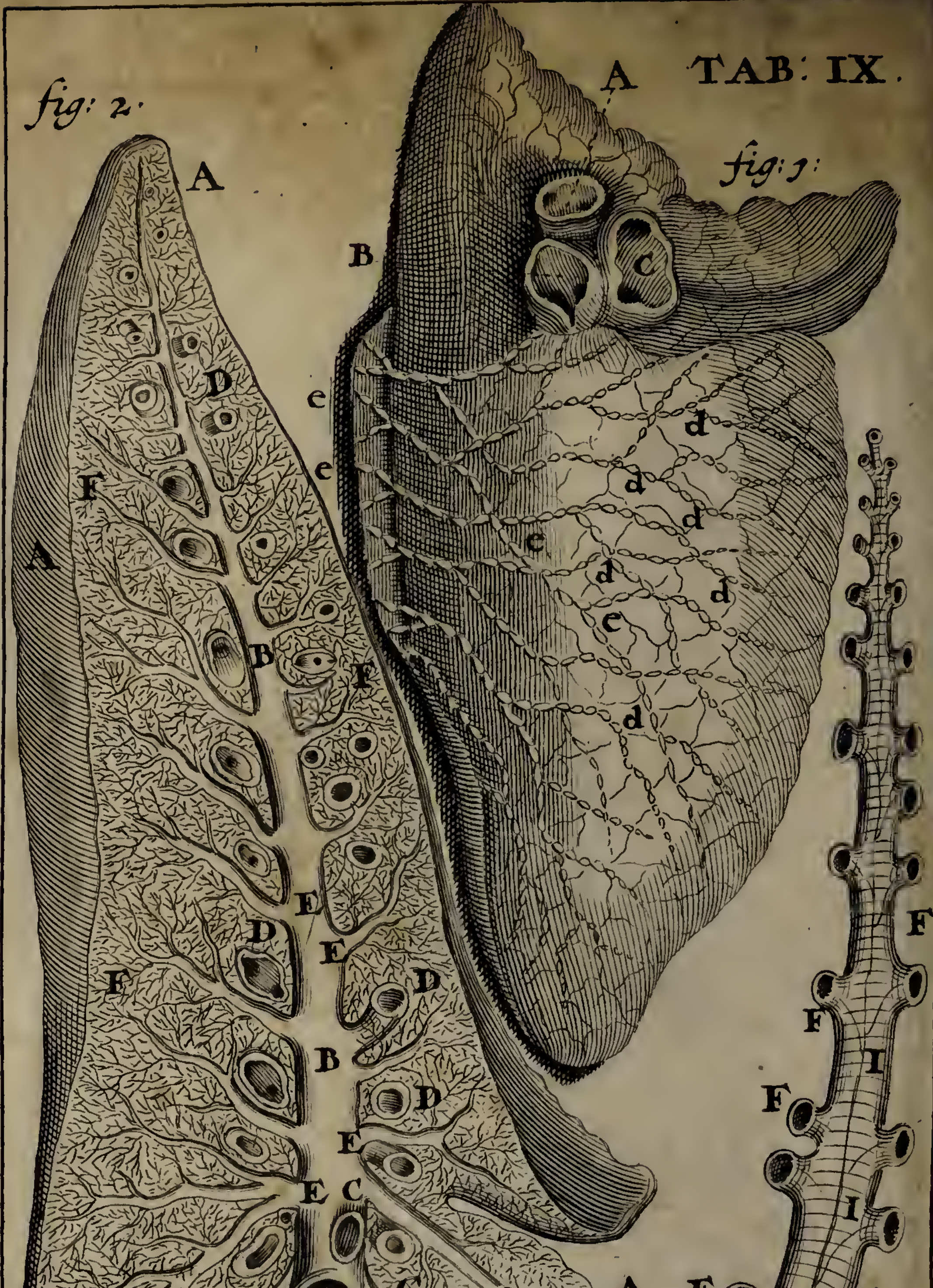
Fig. II.

Fig. I.

TAB: IX.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CHAP. IX.

Of the Oeſophagus.

SYLLABUS.

Eorum quæ videntur in

- *Oeſophago*
  - *Tunicæ*
    - *Exterior Membranea*
    - *Muſculoſa, ſeu Muſculus Vaginalis* cujus
      - *Fibræ*
        - *Rectæ*
        - *Annulares*
      - *Actio*
      - *Paralyſis*
      - *Oedema*
    - *Vaſculoſa ſeu Glanduloſa*
    - *Nervea*
    - *Villoſa*
  - *Pharynx cujus*
    - *Muſculi*
      - *Stylopharyngæi*
      - *Pterygopharyngæi*
        - *Cephalopharyngæi*
        - *Sphænopharyngæi*
      - *Oeſophgiæus, ſeu Sphincter Gulæ*
    - &
    - *Uſus*

Why treated of here.

THO' the OESOPHAGUS properly belongs to another *Venter* of the Body, yet being the Channel thro' which every thing we take is convey'd to the Stomach, and being of a ſubſtance ſo nearly reſembling to it, that they ſeem to be but a Continuation or Expanſion of each other: I thought fit to premit the Account of it to that of the *Stomach*, that the Action of the latter might be conſider'd intire.

Oeſophagus

The OESOPHAGUS, GULA, or GULLET is a *Membranous Pipe deſcending from the* Mouth *to the* STOMACH, between the *Aſpera Arteria* and the *Vertebræ* of the Neck and Back in a ſtrait line, except a little deflexion about the fifth *Vertebra* of the *Thorax*, where it turns ſomewhat towards the Right, to make way for the *great Artery*, which runs along with it to the ninth, where turning again towards the laſt, it croſſes over the *Artery*, and piercing the *Diaphragm*, ends at the Left *Orifice* of the *Stomach*.

Its Coats. It conſiſts of ſeveral *Coats* or *Membranes*, which are vulgarly reckon'd by *Anatomiſts* to be but *three*: Tho' ſome number *four*, and others *five* or *ſix*, allowing the *Cruſta Villoſa* to be one, which laſt diviſion, as the moſt nice, we ſhall follow. The firſt is Membranous and deſign'd only for a covering to the reſt, like the *Membrana Muſculorum Propria*, which it reſembles, and ſeems only a continuation of the *outward* Membrane of the *Stomach* deriv'd from the *Peritonæum*: Tho' ſome *Anatomiſts* derive this of the *Oeſophagus* from the *Pleura*, others from the *Diaphragm*, &c. a Controverſy of no great Importance, and ſcarce worth the deciſion.

Exterior Membranea.

Tunica Muſculoſa, ſeu Muſculus Vaginalis. The ſecond Coat is MUSCULAR, conſiſting of ſtrong fleſhy Fibres, like other Muſcles, ſo that it ſeems to make the *Gula* a *hollow fiſtulous Muſcle*. According to *Steno* and *Willis* it conſiſts of two orders of Fibres, going from top to bottom in *Spiral Lines*, contrary to, and decuſſating each other.

The

This deſcription is very exact of the *Gullet* of *Ruminants*, but not ſo of that of Men: And it is probable, thoſe two great Men before mentioned fell into this Error by examining the *Oeſophagus* of Brutes only, and thence concluding too haſtily that the Structure was the ſame in *Humane*.

Fibræ rectæ.

In Men this Coat conſiſts of two fleſhy *Lamellæ*, like two diſtinct Muſcles. The outward being compos'd of STREIGHT LONGITUDINAL FIBRES, which in the deſcent of the *Oeſophagus* growing narrower, (not far from the *Pharynx*) approach one another nearer, and are implanted into the Parts underneath.

Annulares.

The *Inner* Order of *Fibres* is ANNULAR without any obſervable Angles, tho' it is eaſie by drawing it either upwards or downwards to make them appear Angular, with the Angles pointed towards the force, which may have impos'd upon ſome. But when under no violence they appear perfectly round.

Their Action.

The uſe of this Coat and theſe Orders of Fibres is to promote *Deglutition*, of which the *Longitudinal*, when in contraction, ſhorten the *Oeſophagus*, and ſo make its capacity larger to admit of the Matter to be ſwallow'd. The *Annular*, on the contrary, in their Action, contract the capacity, and cloſing behind the deſcending Aliment, preſs it downwards. So that theſe two Orders of Fibres ſeem to be Antagoniſt Muſcles to one another, yet by different Actions both conſpire to the ſame end, the *Protruſion* of the *Aliment.*

Illuſtration

This Action of theſe Fibres is further evinc'd and illuſtrated by thoſe *Oedematous* or *Schirrous* Tumours, which ſometimes happen on this Part, which render *Deglutition* difficult, eſpecially of *Fluids.* For *Solids*, being capable of the impreſſion of theſe Fibres, and the aſſiſtant Muſcles, are, tho' with difficulty, forc'd thro' the obſtructed part in bulk and quantity as they deſcend thither: But Fluids, not having reſiſtance enough to force the Tumour, are apt upon compreſſion to return upon the *Fauces*, and cannot paſs but in a *Filet* or *Thread* anſwerable to the ſpace left open by the Tumour, and therefore are a long time in paſſing.

Tumours of the Gula.

Paralyſis.

On the contrary in a *Paralyſis*, when the Tone of the Fibres is reſolv'd, yet the bore of the Gullet not obſtructed, Fluids paſs with equal eaſe, as if the part were not diſaffected: But Solids, wanting the force of the Muſcles and Fibres, cannot be got down.

Tunica Vaſculoſa.

The next Coat which is call'd the VASCULAR, conſiſts of a double Membrane. The outward form'd of irregular Fibres, and innumerable Veſſels, interwoven, from whence it is call'd the *Vaſcular*.

The INNER TUNIC conſiſts of ſtreight Longitudinal Fibres ſomewhat fleſhy, mixt with abundance of little Glands, from whence it has been eſteem'd a diſtinct Coat, and is call'd the *Glandulous*. This Membrane adheres firmly to that within it, which is call'd *Glanduloſa*

The NERVOUS Coat, and is extremely fine, made up of exceſſive ſlender Fibres variouſly diſpos'd. This Coat is continu'd to that which covers the *Fauces*, *Mouth* and *Lips*, whence it comes, that tickling the bottom of the *Fauces* by vellicating this Membrane, provokes a Reaching to Vomit. This Membrane is the Inſtrument of Senſation, in this Part, and as ſome think the ſeat of *Thirſt*, or the Organ whereby the Appetite of *Drink* is produc'd. *Nervea.*

This Coat is lin'd inwardly with a villous Cruſt which is not reckon'd among the *Tunics*, which I look upon to be the Excretory Ducts of the Glands, and, not unlike the *Cuticula* to the *Cutis*, to ſerve to defend the ſubjacent Membrane. *Villoſa.*

In caſe of Excoriations by ſharp Humors it has ſometimes been brought up at the Mouth, when the upper Orifice of the Stomach has been cloſ'd by Tumors, which caſe ſeems to differ only in the circumſtances of the part affected, and the way of evacuation from the like Excretions in *Dyſenteries*. *Rejected ſometimes by the Mouth.*

This Membrane ſo caſt up, does not ill reſemble the *Cuticula*, as it appears when rais'd by Veſication; and perhaps there is as near a reſemblance between the Nature of their Cauſes as to the Kind and Degree of Acrimony, both proceeding from Volatile Animal Salts, tho' one be External and Artificially procur'd, the other Internal and Spontaneous, or Fortuitous.

Pharynx.

The upper opening of the *Oeſophagus* ſituated at the bottom of the *Fauces* is call'd PHARYNX. This being the place where the Action of deglutition commences, and where it is mainly perform'd, it is aſſiſted by or rather compos'd of three pair of Muſcles.

Par Stylopharingæum.

The firſt which is call'd STYLOPHARINGÆUM ariſes round and fleſhy from the *Proceſſus Styloides*, and in its oblique Deſcent becomes thicker, and afterwards is expanded on the back parts of the *Fauces*, between the double Series of Fibres of the following Muſcles.

Theſe when they act, draw up and dilate the *Pharynx*.

Par Pterygopharyngeum.

The PTERYGOPHARYNGEUM ariſes from the *Proceſſus Pterygoides*, where the Tendon of the *Muſculus Pterygoſtaphilinus* is reflected. Some fleſhy Fibres of it ſpring likewiſe from the upper Jaw-Bone behind the fartheſt Grinder, and ſome from the ſides of the Tongue, and *Os Hyoides*. From all theſe places its fleſhy Fibres paſs Semicircularly,

circularly, and meet with thoſe of the oppoſite ſide in a middle Line on the back part of the *Pharynx* externally. In the internal Surface of the *Fauces* is another Order of fleſhy Fibres that decuſſate the former at acute Angles. Theſe riſe not only from the ſides of the *Uvula*, but alſo from the Root of the Cartilage excavated for the *Meatus a palato ad aurem*, and deſcend obliquely, to their Inſertions in the Glandulous Membrane of the *Pharynx*, as far as the *Cartilago Thyroides.*

Uſe. This Muſcle ſerves not only to conſtringe the *Pharynx*, but likewiſe to compreſs the *Tonſils* and force out their *Mucus*, upon which ſcore it is likewiſe employ'd in promoting *Hawking.*

Theſe multiplied by Valſalva. *Valſalva*, who has lately given us a new Account of the Muſcles of theſe Parts, denies the Exiſtence of this part of this Muſcle, which ſprings from the *Proceſſus Pterigoides*, which however, is conſtantly and regularly found. The ſame Author has likewiſe of two other parts of this Muſcle, long ſince deſcrib'd and figur'd by Mr. *Cowper*, made two diſtinct Muſcles, and given them two new Names. The part ſpringing from the Tongue he calls *Gloſſopharingæus*, and the other part immediately below it *Hyopharingæus.*

The

And by many others before him upon the Score of their various Origination.

The *various Originations* of the ſeveral Parts of this Muſcle have caus'd it to be generally divided into ſeveral Muſcles: whence come the *Cephalopharyngæus* and *Sphænopharyngæus*, which as thoſe of *Valſalva* before mention'd, are only parts of various Origination, which concur in forming this Muſcle.

Cephalopharingæus. Sphœnopharingæus. Oeſophagiæus *ſeu* Sphincter *Gulæ.*

The OESOPHAGIÆUS, which is generally accounted a *circular* Muſcle, is ſtrictly no more than a Production of the foregoing Muſcle, whoſe Fibres ſurrounding the *Pharynx*, form a *Tendinous* Line on the back part of it, but it being connected on each ſide to the *Cartilago Thyroides*, has been thought to ariſe from thence, and is by *Verheyen* taken for a pair of Muſcles conſpiring to form a ſort of *Sphincter* by their Concurrence. But in theſe things *Anatomiſts* are ſo little agreed, and they are differences of ſo ſmall Importance, that it is not worth detaining the Reader to reconcile them.

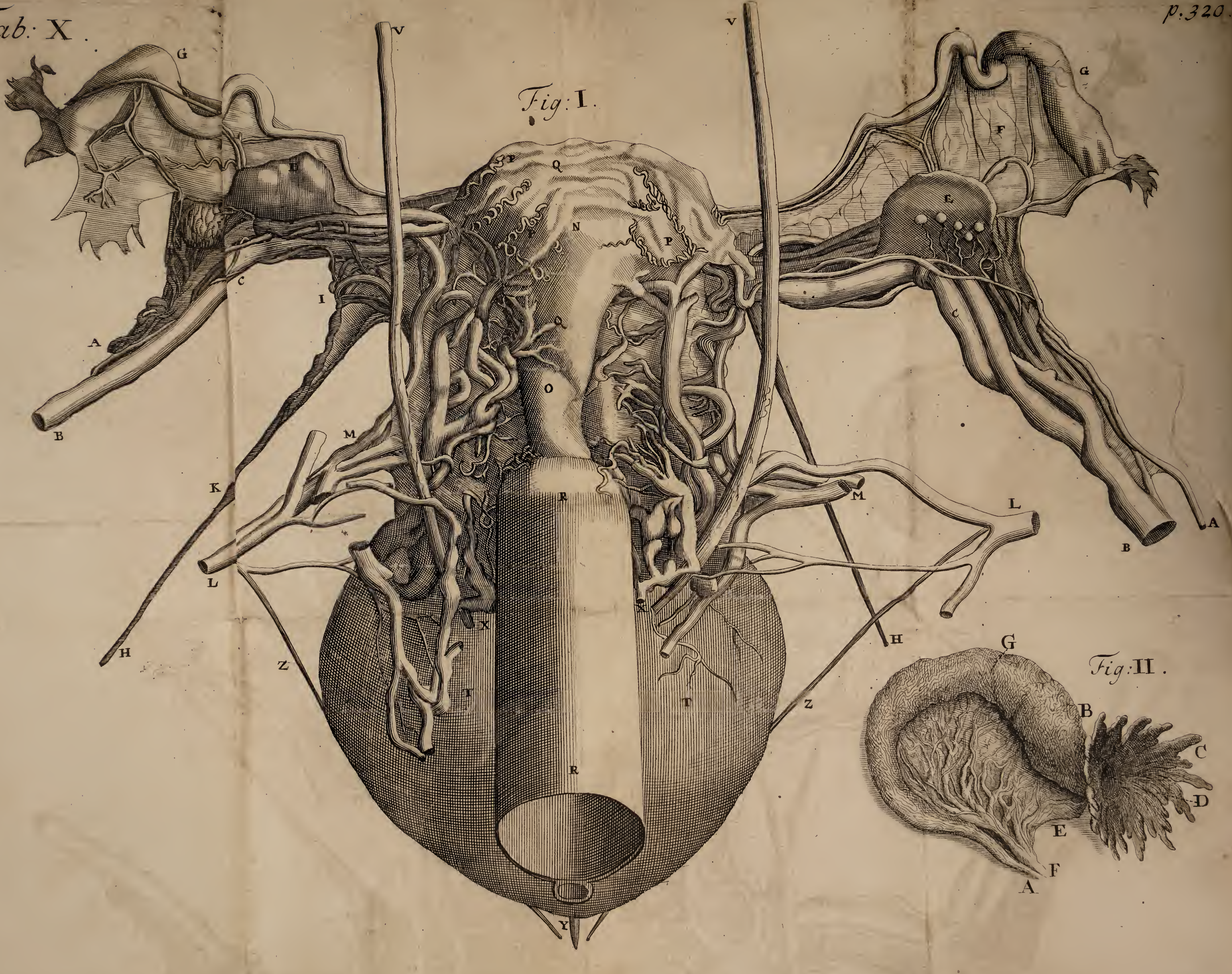
Uſe.

It cloſes the *Gula*, and helps to thruſt down the Aliment when enter'd. In which Action it is aſſiſted by the *Muſculous* Coat of the *Gulæ*, which is by ſome reckon'd among the proper Muſcles and call'd *Muſculus Vaginalis Gulæ*; but is already deſcrib'd here among the Coats.

Vaginalis Gulæ.

CHAP.

Tab: X.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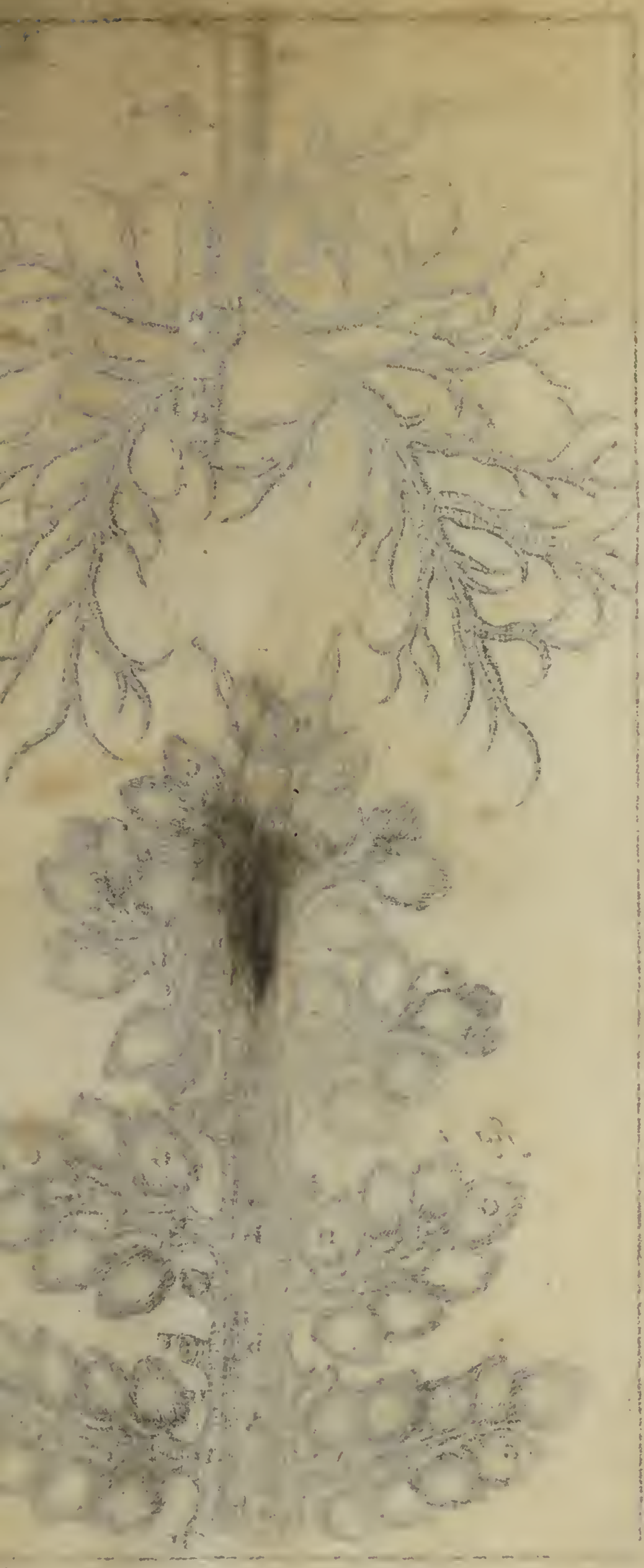

TAB: X.

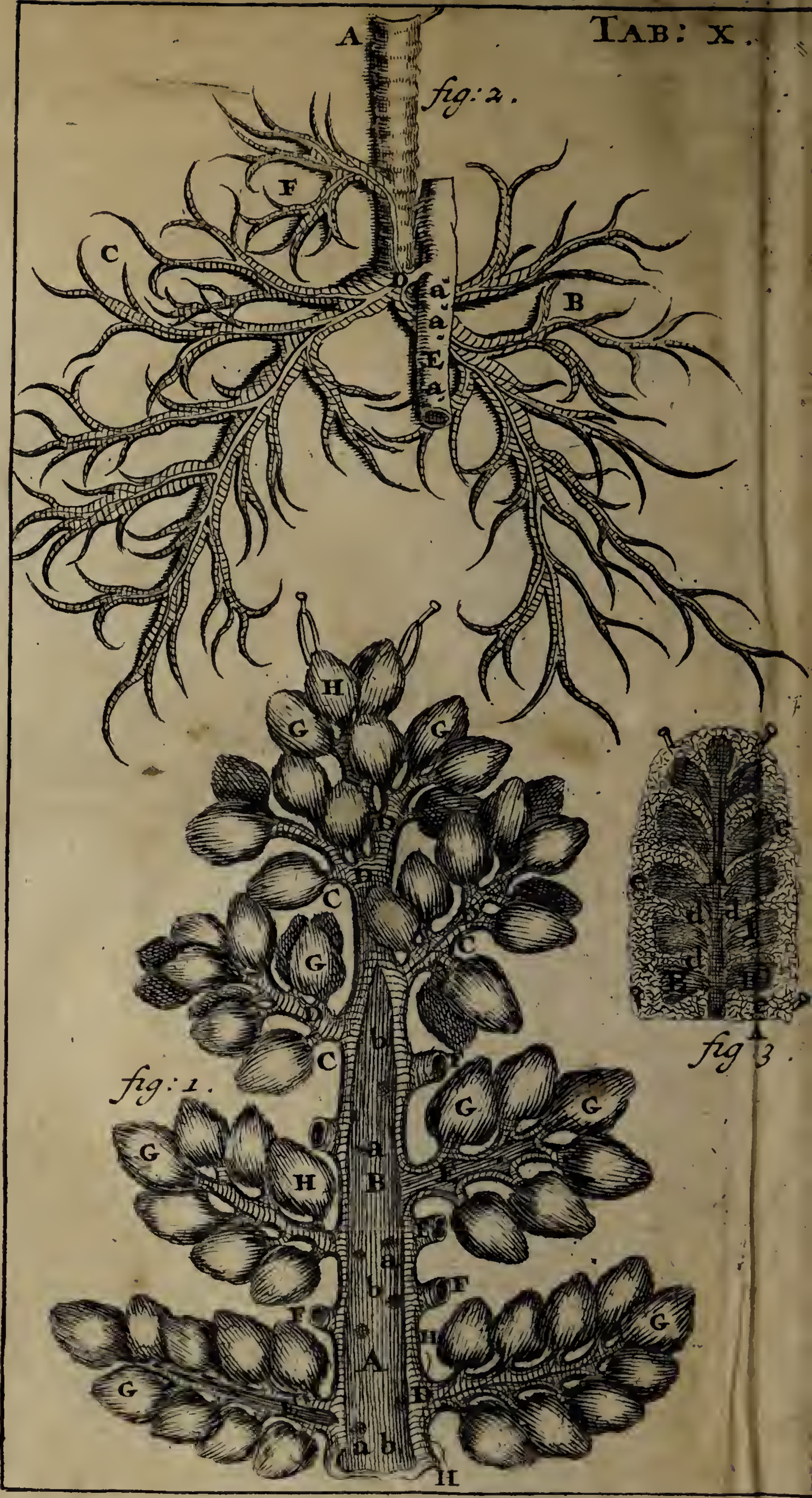

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fig 3.
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CHAP. X.

Of the Stomach.

SYLLABUS.

Eorum quæ in conſpectum veniunt in

Ventriculo
- *Situs*
- *Figura*
- *Orificia*
  - *Cardia*
    - *Parietes*
    - *Fibræ*
  - *Pylorus*
    - *Sphincter*
    - *Antrum*
- *Magnitudo*
- *Tunicæ*
  - *Membranea.*
  - *Muſcularis—in qua Fibrarum*
    - *Ordo duplex ſe interſecantium*
    - *Faſciculus Longitudinalium*
    - *Motus Periſtalticus*
  - *Nervea.*
  - *Cruſta Villoſa*
    - *Plicæ*
    - *Uſus*
- *Vaſa*
  - *Arteriæ Gaſtricæ*
    - *Dextra*
    - *Siniſtra*
  - *Venæ*
    - *Coronaria*
    - *Vas Breve*
  - *Nervorum Ramus*
    - *Exterior*
    - *Interior*
  - *Lymphatica*

Vide App. Tab. 25, 26.

TO the end of the *Oeſophagus* is faſten'd the STOMACH, which lies immediately under the *Diaphragm*; and is partly cover'd on the right ſide by the *Liver*; having on its left the *Spleen*. It is in Figure ſomewhat like a Bagpipe, and has two Orifices. The Left or Superior appended to the *Oeſophagus*, ſeems in reality to be no more than a Continuation or Expanſion of it: It

Stomach.
Situation.
Tab. I.
Fig. II.
Figure.

Cardia.

Pylorus.

Circular Fibres, or Sphincter *of the* Pylorus.

is in Greek called Καρδία; The Right or Inferior Orifice is continued to the *Duodenum*, and is called Πυλῶρος. This Orifice is narrower than the other, and extended to the *Duodenum* by an oblique Aſcent; which Structure, (quite contrary to the other which enters the *Stomach* almoſt perpendicularly with a greater Capacity, that the Aliment may come eaſily in) is given to it to hinder the Aliment from paſſing too precipitately out of the *Stomach*, before it be ſufficiently diſſolved. For this reaſon likewiſe it is furniſh'd with an extraordinary Series of Fibres, which ſerve to conſtringe and contract it more than any other part of the Stomach; which running circularly round it, ſerve as a kind of *Sphincter*, which is open'd by the Contraction of the *Stomach*, and by the appulſe of the Chyle.

Antrum Pylori.

At the bottom of the *Pylorus* is a large Cavity, which *Willis* calls the *Antrum*, and aſſigns to it the Office of keeping the firſt digeſted Chyle, till that which was later taken into the Stomach be digeſted. But if it be true as Dr. *Wharton* obſerves, that there are *Venæ Lacteæ* in the bottom of the *Stomach*, ſuch a Proviſion ſeems unneceſſary, and the moſt fluid part of the Chyle has then another Paſſage; but the Exiſtence of theſe is diſputed.

The Stomach is largeſt on the left ſide, and grows ſtraiter and ſtraiter, as it proceeds towards the *Pylorus*.

Its *Magnitude* is various, and leſs, generally in Women than in Men; though in theſe likewiſe it varies very much, and is largeſt in thoſe that are accuſtomed to eat and drink liberally. *Magnitude*

The *Coats* of the Stomach are generally reckon'd but three; the inner of which is cover'd with a Mucous Spongy Lining like very fine Hair, as in the *Oeſophagus*, call'd the *Cruſta Villoſa*, and is, in my Opinion, as that is, nothing but the *Excretory Ducts* of the *Glands*. *Coats.*

The *Exterior* is that common one which is deriv'd from the *Peritonæum*. This Coat is every where very thin about the Orifices, and at the bottom it is much thicker, and furniſh'd with Fibres ſomewhat like *Muſcular*, and as if they ſerv'd for Motion. *Exterior Coat* or *Membrane.*

The *Second or* MUSCULAR *Coat* conſiſts of thick fleſhy Fibres, of two Orders *Inward* and *Outward*, and are ſo diſpoſed as to interſect each other on all parts of the Stomach at right Angles. The *Inward* run obliquely towards the left upon the upper part of the *Ventricle*: but on the under part they reflect towards the right. *Second or* Muſcular *Coat.* *Two Orders of* Fibres.

In this outward Order or *Lamina* upon the upper part of the Stomach, is a remarkable Parcel, or *Faſciculus*, of Fibres, which paſs from the left Orifice *Longitudinally*, and terminate in the right, entring the *Antrum* of the *Pylorus*. Faſciculus *of Longitudinal* Fibres.

Uſe of this Coat. The Office of this Coat is to conſtringe the Stomach, and drive its Contents towards the *Pylorus*, as likewiſe by the joint Action of its Fibres of both Orders, to make the PERISTALTICK or *Vermicular* Motion, which begins at the left Orifice of the Stomach, and is continued through the whole Tract of the Inteſtines, as may be ſeen in all live Diſſections. In this Motion the *Longitudinal* Fibres ſeem to have the leaſt ſhare; and rather ſerve as Antagoniſts to the reſt: In their Contraction by approximating the two Orifices of the *Stomach*, they hinder the too haſty Expulſion of the Contents.

Periſtaltick Motion.

Uſe of the Longitudinal Fibres.

Nervous Coat. The *Third* Coat is NERVOUS, and conſiſts of Fibres variouſly interwoven, with numerous Blood-Veſſels and Glands.

Its Uſe. This Tunic ſerves for *Senſe*, and by the Pricking of ſome Humours upon this Coat, *Appetite*, or the *Senſe* of *Hunger*, is ſuppoſed by moſt Authors to be rais'd; the Ground of which Opinion ſhall be examin'd hereafter. Its Glands likewiſe may contribute ſomething towards that Quantity of Mucous Humour, which is found in the *Stomach*.

Cruſta Villoſa. The CRUSTA VILLOSA is by ſome Authors reckon'd a fourth *Tunic*, and perhaps not unjuſtly. On the Inner Surface of this, are to be ſeen innumerable *Villi* or fine *Fibrillæ*, riſing perpendicularly every where out of it, which ſome will have to ſerve for nothing but a Defenſative to the *Stomach*, to preſerve it from acrimonious Humours. But I think them to be the *Excretory Ducts* to the ſubjacent *Glands*, which many Authors would have to be (that now exploded thing call'd) a *Parenchyma*, but which are indeed the Organs, by which moſt of that Humour, which is diſcharg'd upon the Stomach, is ſeparated, and theſe *Villi* the immediate Channels through which it is convey'd.

Its Uſe.

Inner Surface,or Plicæ *of the* Stomach.

The Inner Surface of the Stomach, when it is not diſtended by the Contents, is full of *Wrinkles* and *Folds*, made by the *Nervous Coat* and *Cruſta Villoſa*, which, being coextended to the *Muſcular* Coat in its utmoſt Diſtention, and not Contractile, as that is, muſt, when that is in its Contraction, lye thus folded and wrinkled. But in hard Drinkers, and in Stomachs uſually diſtended with Flatulencies, the Tone of the Muſcular Coat being deſtroy'd, the Inner ones lye plain, and even with it.

Hard drinking or Flatulencies deſtroy the Tone.

Uſe of the Plicæ.

By the means of theſe PLICÆ the *Nervous* Coat, which is not contractile, but yet extreamly ſenſible, is preſerv'd from being painfully ſtretch'd, when the *Stomach* is diſtended: Some will likewiſe have them to ſerve to be a ſtop or check to the ſliding of the *Aliments* too ſoon out of the *Stomach*; but this ſeems not a genuine uſe of it, be-

Not to ſtop the haſty Courſe of the Aliment.

cauſe, when the *Stomach* is at its full Diſtention, which ſhould be the neceſſary time of checking, the Surface is then more plain, and when the Stomach is quite empty, and there can be none of that uſe, the Corrugations are then greateſt.

Nor to keep a Reſerve of Stale Chyle *for a* Ferment.

Dr. *Gliſſon* and *Willis*, and after them moſt *Anatomiſts*, have thought, they ſerv'd likewiſe, and that principally too, to ſtop and keep a reſerve, a ſtock of *old Chyle*, which they thought by the ſtay in the *Stomach*, to be exalted into a kind of *Ferment*, which ſerv'd not only to ſtimulate the Coats of the *Stomach*, and to excite Appetite; but alſo as a *Menſtruum* to ferment and diſſolve the future Aliment. To this Opinion I ſhall ſpeak more largely elſewhere, and therefore ſhall leave the Reader to think of it as he pleaſes in this place.

Veſſels.

The *Veſſels* of the Stomach are very numerous. Its *Arteries* come from the Branches of the *Cæliack* both Right and Left, and are call'd the *Gaſtricks.* Its *Veins* go to the *Porta*, ſome immediately into the *Trunk*, and ſome into the *Splenick* Branch. The firſt are call'd the *Right Gaſtricks*; and the other the *Left.* To theſe comes another large *Vein*, which runs along the whole length, and with its Roots embraces almoſt the whole *Ventricle* whence it ſprings, and is therefore call'd the *Coronary.* It ſends off likewiſe ſome Branches which joyn with the

Coronary Vein.

the Splenick Branch at the *Spleen*, which are by *Anatomiſts* call'd the *Vas Breve*; but ſhould more properly be call'd *Vaſa Brevia*, becauſe of their number. Through thoſe Veſſels the Ancients thought that a Melancholick Humour was convey'd from the *Spleen* to the *Stomach*, which ſerv'd to vellicate the Membranes of it, and to excite Appetite. But this Fancy is refuted by the diſcovery of the Circulation of the Blood, which has demonſtrated, that nothing comes through thoſe Veſſels from the *Spleen* to the *Stomach*; but that on the contrary, Blood is convey'd from the *Stomach* into the *Splenick* Vein, and by that to the *Vena Porta*. *Vas Breve.*

Its NERVES are conſiderable both for Number and Magnitude, and come from the Trunks of the *Par Vagum*, which, deſcending along the *Oeſophagus*, are divided into two Branches *Interior* and *Exterior*, of which the Interior Joyning again together from one Trunk, which falls down along the *Oeſophagus*, to the out-ſide of the left Orifice of the *Stomach*, and from thence ſpreads it ſelf all over the bottom of the *Stomach*. The Exterior Branches likewiſe joyning a little lower, deſcend to the inner ſide of the ſame Orifice, and from thence diffuſe themſelves over all the upper part of the *Stomach*. It receives likewiſe ſome Branches from the *Plexus* form'd in the Nerves.

Abdomen near the *Stomach*, by the Branches of the ſame Nerve, which is call'd the *Plexus Cardiacus*.

Lymphaticks. The External Surface of it is plentifully cover'd with *Lymphaticks*, which diſcharge themſelves into the *Receptacle* of *Chyle*.

Tab: XI.

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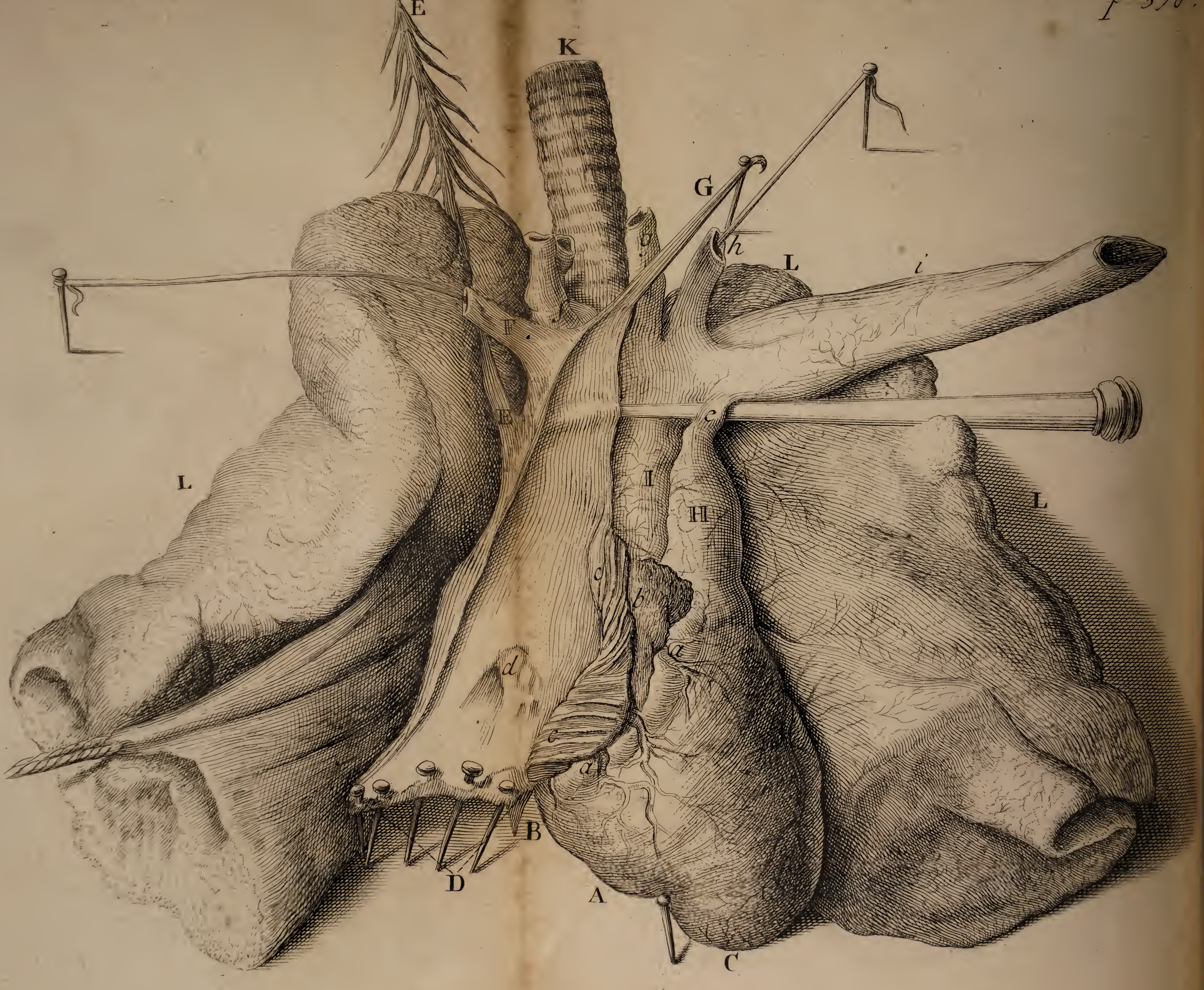

TAB. XI
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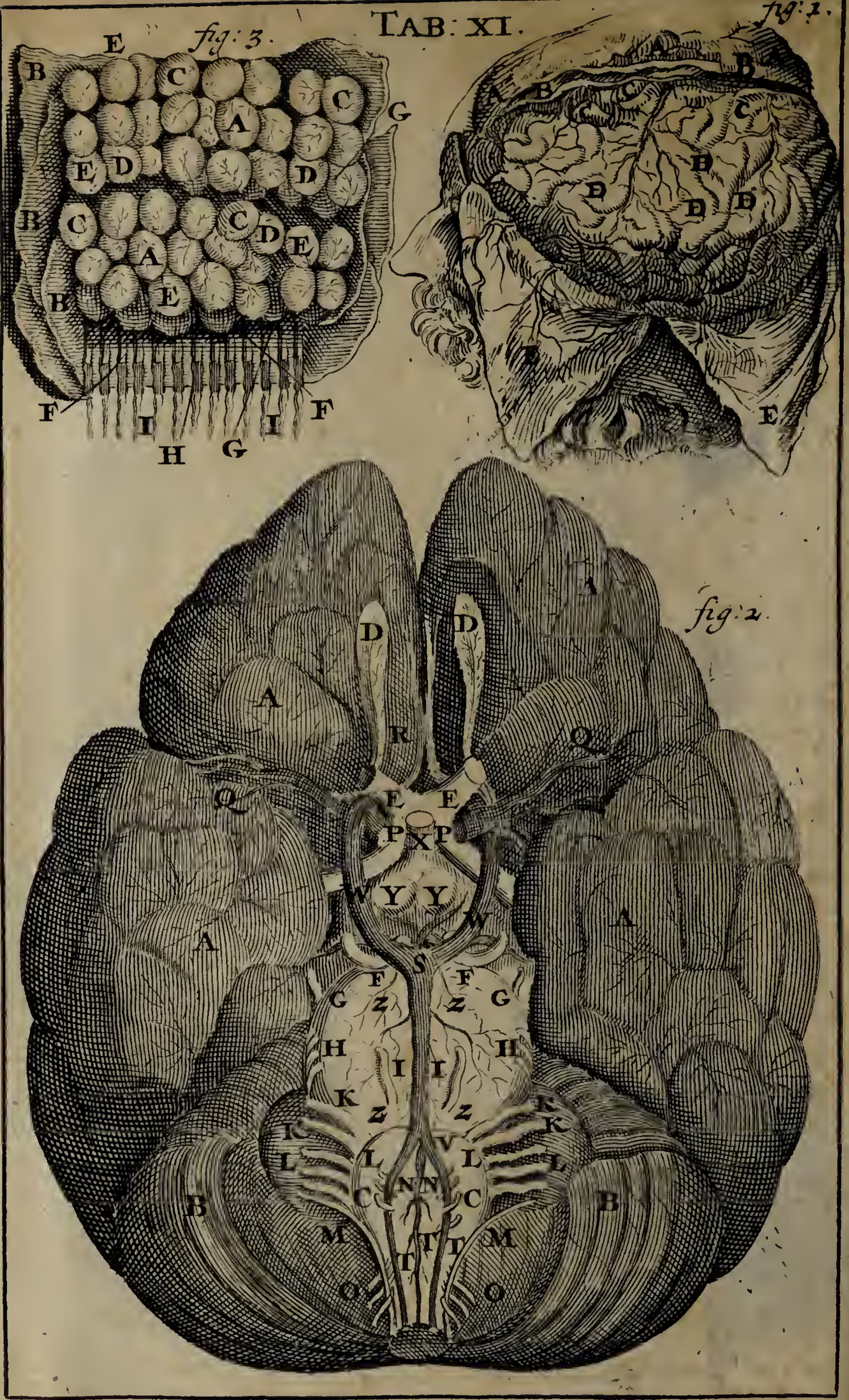
TAB: XI.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CHAP. XI.

Of the Inteſtines.

SYLLABUS

Quærendorum in

Vide App. Tab. 27.

Inteſtinis
- *Numerus*
- *Tunicæ*
- *Connexio*
- *Diviſio in*
  - *Tenuia*
  - *Craſſa*
- *Motus Periſtalticus*
- *Longitudo*
- *Amplitudo*
- *Glandulæ*
  - *Minores Conglomeratæ Tenuium*
  - *Majores Solitariæ Craſſorum*
- *Vaſa Sanguifera*
- *Nervi*
- *Uſus*
- *Tenuia*
  - *Duodenum—in qua Oſcula Ductuum*
    - *Bilarii*
    - *Pancreatici*
  - *Jejunum*
  - *Ileum — in quo Valvulæ Conniventes*
- *Craſſa*
  - *Cæcum ſeu*
  - *Appendicula Vermiformis*
  - *Colon in quo—*
    - *Valvula*
    - *Ligamenta*
  - *Rectum in quo Muſculi—*
    - *Sphincter*
    - *Levatores Ani*

Inteſtines. THE INTESTINES which ſeem to be nothing but a Continuation of the *Stomach*, conſiſting of the ſame Number of Coats, fabricated in the ſame manner, are protended with various Circumvo- *Coats.*

lutions and Inflexions to the *Anus*, thro' which they diſcharge the Excrementitious part of their Contents out of the Body.

Connexion. They are, when ſeparated from the *Meſentery*, to which they are all along connected, of a very great Length, ordinarily about ſix times as long as the Perſons whoſe they were. And tho' they ſeem to be but one continu'd Channel or *Fiſtula:* Yet becauſe in ſeveral Parts their Magnitude, Figure, and Thickneſs are different. They are in general divided into the *Thick* and *Thin:* And theſe again are each of them ſub-divided into Three; the three *Thin* are call'd *Duodenum*, *Jejunum* and *Ileum:* And the *Thick*, *Cæcum*, *Colon*, and *Rectum*.

Diviſion into Tenuia *and* Craſſa.

Number.

Periſtaltick *Motion.* They have all of them in common a kind of *Vermicular* Motion, which, beginning at the *Stomach*, is propagated downwards, and is call'd the PERISTALTICK *Motion.* To facilitate that they are generally lubricated with a great deal of *Fat*, eſpecially the *Thick Ones*, whoſe Surface being ſomewhat more uneven, and the Contents leſs fluid than thoſe of the *Thin*, they need ſomewhat more to make them ſlide eaſie.

Duodenum. The firſt of the *Thin* Guts is call'd DUODENUM, and reaches from the right Orifice of the *Stomach*, as far as the *Vertebræ* of the Back on the left Side, where, at the firſt Angle made by the *Inteſtines*, it ends, which is about twelve Inches: From which Meaſure it ſeems to have taken its Name. This Meaſure however is very far from being very Exact, as being much too largely computed. *Its Length.*

Into this Gut, the *Gall Duct*, and *Pancreatick Duct* empty themſelves: And their ſeveral Liquors mix with the *Chyle*. *Orifices of the* DuctusCommunis, and Pancreaticus.

The next Inteſtine is the JEJUNUM, ſo call'd becauſe it is generally found more empty than the reſt: Which may be occaſion'd partly by the Fluidity of the *Chyle*, which is greater in this Inteſtine, than in any of thoſe that follow it. And partly by its Capacity, being ſomewhat larger than that of the *Duodenum*, and therefore it gives a freer Paſſage, and perhaps alſo the Irritation of this Gut thro' the Acrimony of the *Bile*, which is diſcharg'd upon the *Inteſtines* a little before the beginning of this Gut, may contribute ſomething towards accelerating the Paſſage of the Contents. However it may ſeem ſufficient to ſome, that thro' the great Number of *Lacteals*, with which this Gut abounds more than any other, the Deſcent of the Contents, here ſtript of the moſt fluid Parts, ſhou'd in the reſt be more ſluggiſh, by reaſon of their greater Conſiſtence. *Jejunum.*

This *Inteſtine* is allow'd to poſſeſs almoſt the whole *Umbilical* Region, and its Length is generally computed to be about twelve, or thirteen Hands breadth. *Its Length.*

The

Ileum. The ILEUM, which is the third Inteſtine, is ſituated below the *Navel*, and fills the *Ilia* with its numerous Folds and Convolutions. It is the longeſt of all the *Inteſtines*, being eſteem'd to be one and twenty hands long: *Its length.* But theſe Eſtimates are ſomewhat arbitrary, becauſe it is not exactly ſettled among *Anatomiſts*, where the *Jejunum* ends, or the *Ileum* begins; neither is it eaſie or neceſſary to do it. In both this and the preceding *Inteſtine*, the *Inner Tunic* is much corrugated, the looſe Folds of which have been thought to do in ſome Meaſure the Office of Valves, and have therefore by Authors been call'd *Valvulæ Conniventes*, *Valvulæ Coniventes* which are fram'd as in the *Stomach*, only by the Inner Coat being larger than the Outward.

Next to this follow the *Thick Inteſtines*, *Cæcum.* the firſt of which is call'd the CÆCUM, which has a lateral Inſertion into the upper end of the *Colon*, and is not perforated at its other Extremity, but hangs to it like the Finger of a Glove, and is about three or four Inches long.

Uſe obſcure. The true uſe of this part is not yet determin'd: And ſome late *Anatomiſts* have thought, that the Name likewiſe is miſtaken, not allowing this to be the *Cæcum* of the Ancients, which they imagin'd to be that thick globous part of the *Colon*, which is immediately appended to the *Ileum*, and therefore they have given this part the Name of *Appendicula Vermiformis*. But this is a Controverſie not worth deciding, and therefore I ſhall paſs it over. *Appendicula Vermiformis.*

This *Cæcum* or *Appendix* is proportionably bigger in Infants than Adults; and in many other Animals, even ſmaller than in Men; and is at the unperforated Extremity ſlightly connected to the Right *Kidney*.

The next of the *Thick Inteſtines* is the COLON, which is much the largeſt, and moſt capacious of them all. *Colon.* It begins at the *Cæcum*, and is with that connected to the Right Kidney, *Connexion* thence with a winding courſe it proceeds towards the *Liver*, where it is ſometimes ty'd to the *Gall-Bladder*, and by that ting'd with Yellow. From the *Liver* it runs a-croſs under the bottom of the *Stomach*, where it is by very fine thin Membranes faſtned to the *Spleen*, and marches over the Left *Kidney*, where its Cavity is ſometimes very much ſtreightned, and deſcending ſo to the bottom of the *Os Ilium*, and from thence returning to the upper part of the *Os Sacrum*, and there making the Figure of a Circumflex, it ends in the *Rectum*.

At the entrance of the *Ileum* into this Gut (is placed a *Valve* form'd out of the *Valve.* Production of the inward Coat of the *Ileum*, which, like the Finger of a Glove, when its Extremity is cut off, hangs looſe in the

Ligaments

Cavity of the *Colon*, by which means it ſtops the return of the Excrements, tho' ſometimes, as in Inverſions of the *Periſtaltick Motion*, it proves not ſufficient for that Uſe. It has a great many *Cellulæ*, or as it were diſtinct Cavities fram'd by a Coarctation of the Gut by two *Ligaments*, or Bundles of membranous, fleſhy Fibres about half a Finger broad, each running on each ſide the Gut oppoſite to each other, the whole length of it, and as it were girting it in at certain diſtances, thereby making it reſemble a Glaſs *Incorporator* uſed now a-days to mix *Oyl* and *Vinegar*.

Rectum. *Connection*

The next and laſt of the *Inteſtines* is the RECTUM, which reaches from the *Os Sacrum* to the *Anus*, and is plain without Cells; It is faſt ty'd to the *Oſſa Sacrum* and *Coccygis* by means of the *Peritonæum*, and in Men to the *Neck* of the *Bladder* of *Urine*, in Women to the *Vagina Uteri*, to which it is ſtrongly connected by a Membranous Subſtance. That Subſtance of the *Vagina* and *Inteſtine* are hardly diſtinguiſhable from one another.

Length.

The *Length* of this Gut is ordinarily about a hands breadth and an half, and its Capacity about the thickneſs of three Fingers; Its lower end the *Anus* is furniſh'd with three Muſcles.

Sphincter Ani.

The firſt of theſe is a *Circular Muſcle* ſerving to ſhut the *Anus*, and keep the Excrements from coming away involuntarily, and is call'd the SPHINCTER ANI. It is near two Inches broad, and hangs down below the *Inteſtine* it ſelf near an Inch. It is faſtned on the ſides to the Bones of the *Coxendix*, and behind to the *Os Sacrum:* Before in Men to the *Muſculus Accelerator Urinæ:* In Women to the *Vagina Uteri.* Some would make this two Muſcles, and ſome three; but that diſtinction ſeems not very inſtructive; and perhaps not well grounded, and therefore as ſuch I ſhall lay it aſide.

The other two Muſcles are call'd the *Levatores Ani*, and have their riſe on each ſide, from the inner lateral part of the *Iſchium*, and end in the *Sphincter* before deſcribed. Theſe ſerve to retract or pull back the *Sphincter* after the Expulſion of the Excrements; which, eſpecially after hard Stools, is apt to be too far protruded, and to need the Aſſiſtance of theſe Muſcles to reduce it. Mr. *Cowper* in his *Myot. Reform.* Cap. V. ſays, That in their Progreſs to the *Anus*, they on both ſides paſs cloſe over the *Proſtatæ*, which they compreſs in *Coitu*, as they alſo do the *Veſiculæ Seminales*, and oblige thoſe parts to void their Contents into the *Urethra*, in which Action the *Diaphragm* and *Abdominal Muſcles* co-operate.

Levatores Ani.

There are farther to be conſider'd in the *Inteſtines* a great number of GLANDS, which

Glands of the Inteſtines.

Conglomerate in the ſmall Guts. which in the *Inteſtina Tenuia* are gather'd together in heaps, as it were like bunches of Grapes: In theſe Inteſtines they are very ſmall, and were it not for their Coacervations, ſcarce remarkable. *Larger but Solitary in the thick ones.* But in the *Inteſtina Craſſa* they are much larger, not gather'd like the others but diſpers'd; and though very numerous, come under the Denomination of SOLITARY *Glands.*

These *Glands* diſcharge a Liquor into the *Inteſtines*, whether ordinarily for any thing more than Lubrication of the *Inteſtines*, and diluting their Contents, I will not determine: Though through theſe ſeems the greateſt part of the diſcharge to be made; which either upon extraordinary *Fluxes*, or upon the Adminiſtration of *Catharticks*, we have frequent occaſion to obſerve.

Blood Veſſels. Theſe Inteſtines in general are furniſh'd with Blood from the *Meſenterick Arteries*, which is return'd by the *Meſeraick Veins*: But the *Duodenum* receives a Branch of an *Artery* from the *Cæliack*, which is call'd *Duodena.* DUODENA, to which anſwers a *Vein* of the ſame Name, that likewiſe returns the Blood to the *Porta*, and the *Rectum* others, *Hæmorrhoids Internal and External.* which are call'd HÆMORRHOIDS; the *Internal* from the Inferior *Meſenterick*; and the *External* from the *Hypogaſtrick*, with *Veins* correſponding of the ſame Name, that alſo that go to the *Porta.* Theſe Veſſels ſpread the *Inteſtines* with abundance of Ramifi-

Ramifications, and are frequently diverſify'd in ſeveral ſubjects of the ſame *Species*; much leſs are they to be depended upon for an uniform Appearance in Animals of a different Kind.

Nerves. The NERVES of the *Inteſtines*, come ſome of them from thoſe of the *Stomach*, and ſome from the great *Meſenterick Plexus*, which diſtributes Branches to all the *Inteſtines*.

The remaining Veſſels of the *Inteſtines*, are the *Lymphæducts* or *Venæ Lacteæ*, of which in the following Chapter.

CHAP. XII.

Of the Meſentery, Lacteal Veins, Receptaculum Chyli, *and* Ductus Thoracicus Chyliferus.

SYLLABUS.

Spectandorum in MESENTERIO, *&* LACTEIS *quæ ſunt in*

- *Meſenterio*
  - *Diviſio*
  - *Origo*
  - *Membrana* } *Adipoſa*
  - *Vaſa* } *Adipoſa*
  - *Figura*
  - *Peripheria*
  - *Glandulæ*
  - *Lactea*
  - *Valvulæ in Lacteis.*
- *Lacteis*
  - *Receptaculum Chyli*
  - *Ductus Thoracicus*——*cujus*
    - *Divaricatio*
    - *Oſcula in Subclaviam*

Meſentery. THE MESENTERY (ſo call'd, becauſe it is in the middle of the *Inteſtines*, and connects them together) conſiſts of a double Membrane, variouſly interwoven with a diverſity of Veſſels, *Nerves*, *Arteries*, *Veins*, *Lacteals*, *Adipoſe Ducts*, and *Glands*.

It

TAB. XII.

Fig. 1.

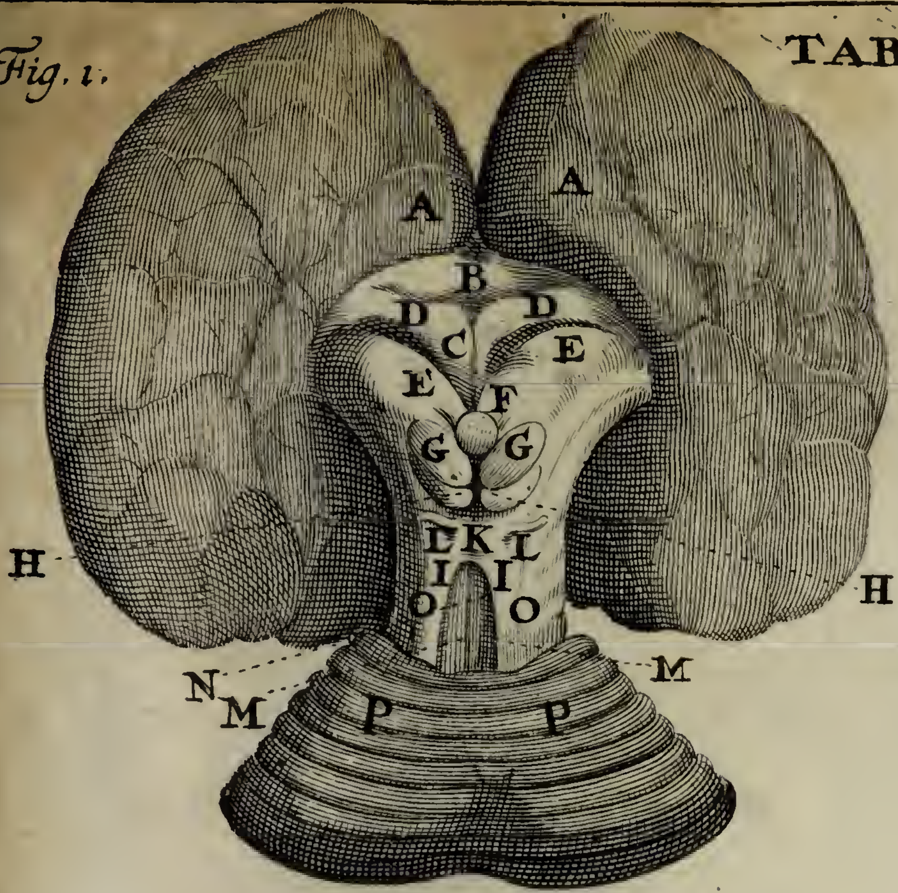
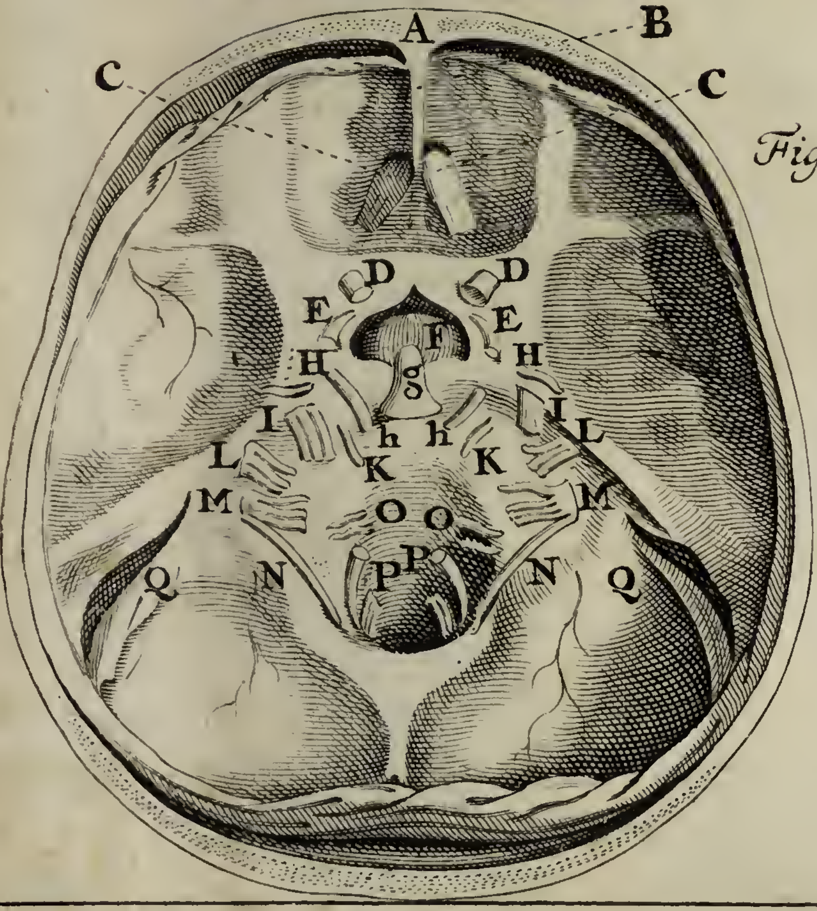
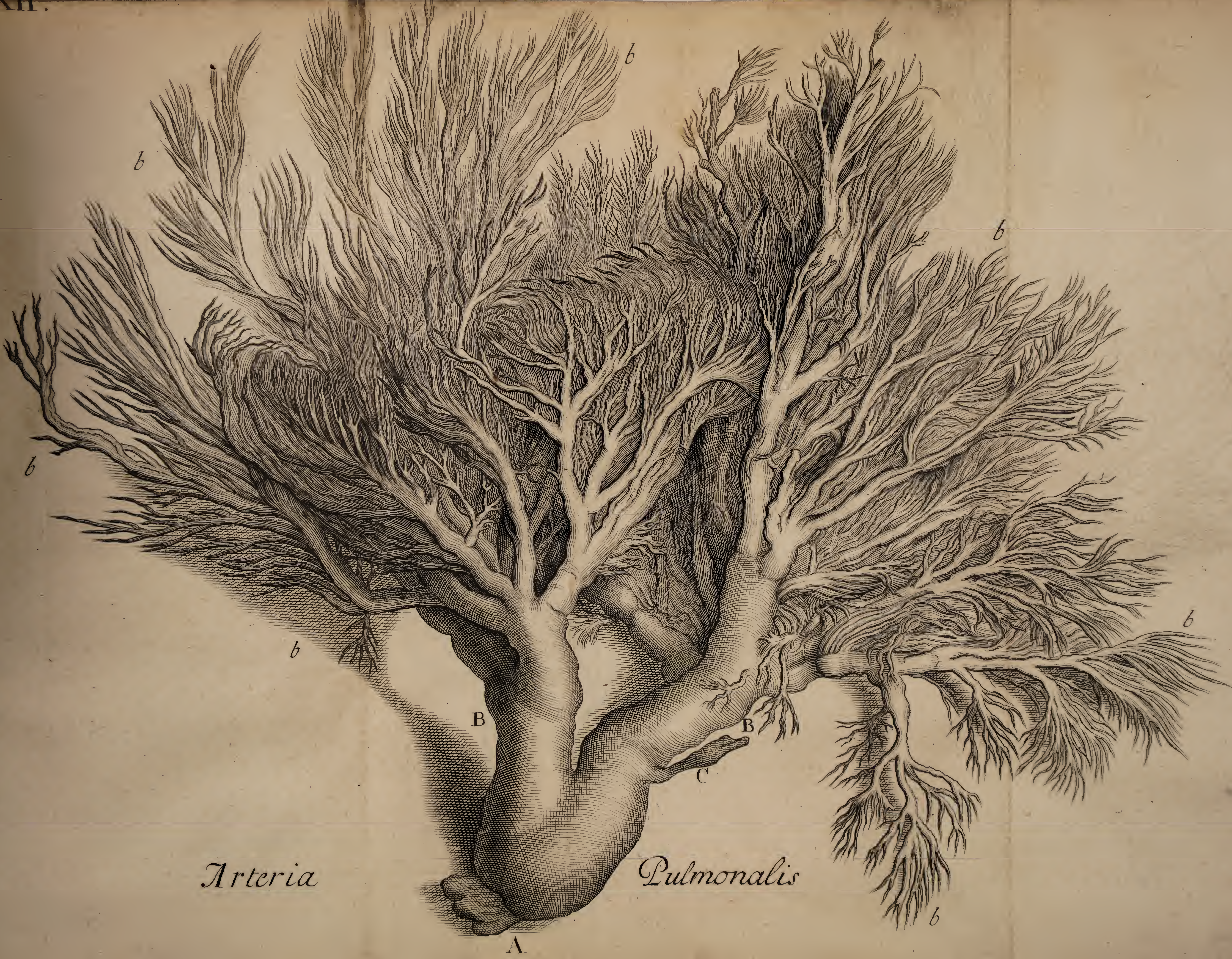


Fig. 2.




b
b
b
b
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b
b
B
B
C
A
Arteria Pulmonalis

It has been ordinarily divided into two Parts, the *Meſaræum*, and *Meſocolon*, the firſt appended to the *Inteſtina Tenuia*, and the latter to the *Craſſa*. This is a Diviſion of no great Moment, and therefore no farther to be inſiſted on. *Diviſion.*

The *Origine* of the *Meſentery* is deriv'd from the firſt and third *Vertebræ* of the Loins; where the Productions of the *Peritonæum* form two ſtrong Membranes, which being joyn'd together make the *Meſentery*. *Origine.*

Between theſe two is a third Membrane diſcover'd by the Learned Dr. *Wharton*, thicker than either of the other two, and perhaps as ſome *Anatomiſts* think properly to be look'd upon as the *Adipoſe Membrane*, abounding both with *Blood* and *Adipoſe* Veſſels, wherewith the *Meſentery* is ordinarily plentifully ſtor'd. *Adipoſe Membrane.*

The Figure of it is near *Circular*, tho' for want of room lying in Folds and Wrinkles, it ſeems but of ſmall Extent, yet when Expanded, it is about four Ells in Circumference. *Figure.* *Circumference.*

Its Veſſels are the ſame that we have accounted for in the preceeding Chapter.

It has, interſpers'd up and down, many *Glands*, which in a ſound State are ordinarily cover'd with *Fat*, moſt of which ſeldom exceed the Magnitude of a ſmall Nut, and are in Number and Poſition ſo various *Glands.*

and uncertain, that it is in vain to attempt to give a certain Account of them, as to theſe Particulars.

Pancreas Aſellii.

In ſome Brutes, eſpecially Dogs, there is a large Gland found in the middle of it, which by *Aſellius*, was call d the *Pancreas*, to which moſt of the *Lacteal Veſſels* reſort; and from thence the *Chile* is convey'd by large Veſſels, but not ſo numerous as thoſe before ſpoken of, which have their riſe immediately from the *Inteſtines*, and are call'd *Lactea Secundi Generis*, which Diviſion will ſcarcely be made out in Men,by any viſible Diſtinction, their *Lacteals* not being gather'd ſo uniformly to one Part, but diſtributed indifferently to all the *Glands* of the *Meſentery*.

Uſes.

The *Uſe* of the *Meſentery* it ſelf ſeems to be, Firſt, To gather the *Inteſtines* into a narrow Compaſs, that the Courſe of the *Chyliferous* Veſſels towards their *common Receptacle* may be but ſhort; and next to cover and protect them and the *Blood Veſſels*; And, Thirdly, So to connex and diſpoſe the *Inteſtines*, as to ſecure them from an Entanglement, which might hinder their *Periſtaltick* Motion.

Origine of the Lacteals.

The LACTEAL VESSELS, or VEINS, proceed in great number from the *Inteſtina Tenuia*, eſpecially the *Jejunum*, from whence they ariſe in greater number than from the reſt. It is yet a Doubt among the *Anatomiſts*, whether the *Inteſtina Craſſa* afford any or not. The impoſſibility of a Human Diſſection proper for ſuch an Inquiry, gives no room either to affirm or deny. But the Contents of the *Inteſtina Craſſa* ſeem not likely to afford much *Chyle*, and therefore if there be any, 'tis probable they are but very few.

Chyle *how ſoon made.*

In *Brutes*, if diſſected at a reaſonable time after feeding, two three or four hours, according to what they have fed upon, they may be ſeen very tumid and white; and, if wounded, the Chyle flows plentifully from them: But, if inſpected when the Stomach of the Animal has been any time empty, they appear like *Lymphaticks*, viſible indeed, but fill'd with a tranſparent Liquor. That the *Lacteals* have a Communication from the Cavities of the *Inteſtines*, is demonſtrated by their Contents the *Chyle*. How their Pores are diſpoſed to receive it, has not yet been diſcovered: Nor will Microſcopes (I am afraid) ſhew us their paſſages in the *Villous* Coat of the *Inteſtines*; nor is there any way yet known to us, whereby we can fill the *Lacteals* from the Cavities of the *Guts* after death: We may be allow'd to imagine, that their entrance into the *Gut* is oblique, not unlike that of the *Vreters*, ſince neither Wind nor Liquors can paſs them from thence. Neither can their paſſages be altogether like the *Vreters* into the

Communication with the Inteſtines.

the *Bladder*, becauſe we can no more make *Quick-ſilver* paſs from the Trunks of the *Lacteal* Veſſels into the *Guts*, than from the *Guts* into them. Since therefore thoſe Pores of the *Lacteals* can only receive any thing in the Living State, we may be allow'd to imagine, the *Periſtaltick* Motion of the Guts ſo diſpoſes them, that they then only receive the *Chyle*. This we think may be done by the *Circular* and *Longitudinal* Fibres of the *Inteſtines*, ſtill applying the Internal Coat of the Guts to their Contents, by which means its Pores abſorb the *Chyle* from the Excrementitious part.

Manner of it.

After the *Chyle* is got into the *Lacteals*, it meets with the *Lympha* from the *Arteries* in the *Guts*, before it arrives in the Trunks of the *Lacteals* in the *Meſentery*: Though this Communication between the *Arteries* and the *Lacteals*, may be argued from the *Lacteals* having *Lympha* always in them, when they are not charged with *Chyle*; yet we are beholding to an Experiment for rendring it more certain; for by injecting *Mercury* into the *Meſenterick Arteries*, not only the *Meſenterick Veins* but *Lacteals* alſo are fill'd with it, and the *Mercury* may be driven on to the *Glands* of the *Meſentery*; of which Mr. *Cowper* has ſeveral very neat Preparations from *Human* Bodies, as well as *Quadrupeds*, by him, where the *Lacteals* are thus fill'd.

Mixes with the Lympha.

In

Pancreas Aſellii *in* Dogs *and other* Brutes *only.*

In Dogs there is a large *Gland* in the middle of the *Meſentery*, which as before obſerv'd, is call'd the *Pancreas Aſellii*, in which moſt, if not all the *Lacteals* terminate; and thence proceed in fewer but much larger Trunks, to the *Common Receptacle* diſcover'd by *Pecquet.*

But in Men no ſuch Gland being ordinarily found, nor Live Diſſections permitted, the *Vaſa Lactea Secundi Generis* remain diſputable: Though the *Receptacle*, and *Thoracic Duct*, which are as large as in any Animals whatſoever, in proportion to the Magnitude of their Bodies, leave us no room to doubt of the ſame way of Conveyance, though probably by more and leſs Channels between the *Glands* and the *Receptacle*, for the Reaſons already given.

Valves *in the* Lacteals.

Theſe *Chyliferous* Veſſels opening with their little Mouths into the *Inteſtines*, receive the prepar'd fluid part of the *Aliment*, and appear at Intervals as it were girt and ſtreightned, and when preſs'd, do not admit of a Reflux towards the *Inteſtines*, tho' the Liquor be eaſily propell'd towards the *Glands*; which argues that there are *Valves* in them, though they are too Minute to have the *Structure* or *Form* of them examin'd.

Receptaculum Chyli.

The *Receptaculum*, or *Ciſterna Chyli*, lies near the left *Kidney*, under the *Emulgent* and *great Artery:* Its Capacity and Extent

Progreſs of the Chyle. has been found in Human Bodies, to be much larger than hitherto obſerv'd. Mr. *Cowper* has given us a Figure of a Preparation of it fill'd with *Mercury*, which he has ſtill by him, conſiſting of three large Trunks, two of which are more than a quarter of an Inch in their Diameters, the third is ſomewhat leſs: This Diviſion of it, he thinks, is more requiſite in *Human* Bodies than in *Quadrupeds*, on the Account of their Poſition, the latter being *Horizontal*, the *Chyle* and *Lympha* does more readily paſs from one large Receiver into this *Thoracick* Duct; but in Man its Progreſs being *Perpendicularly* aſcending, it ſeems neceſſary to divide this Receptacle of *Chyle*, as we ſee in *Hydroſtatical* Engines, in order to take off that reſiſtance which the weight of the *Chyle* would occaſion, were it contain'd in one common Receiver.

Tab. II. Fig. 3.

Oſcula. Its *Exit* is upwards in the *Thorax*, from whence it is call'd the *Ductus Thoracicus*, and it ends in the *Subclavian Vein.* Its Membrane is the ſame with that of the *Receptaculum*; beſides that in the *Thorax*, it ſeems to be furniſh'd with another *Integument* from the *Pleura*. A little more than the third part of its way, or about the middle, it begins to divaricate, but after a Progreſs of about the breadth of two *Vertebræ*, it unites again, and at laſt diſcharges it ſelf with an oblique Inſertion into the *Subclavian*,

vian, at which is placed a *Valve*, as there are in divers other places in the Tract of it, which appear, as in the *Lacteals*, plainer by the Nodes, and the denial of the regreſs of the Liquor when preſs'd, than from any Demonſtration that can be made to the Eye. From hence by the *Subclavian* the *Chyle* is deliver'd to the *Cava*, and ſo to the Heart, and thence again to all the Body by means of the Arteries.

CHAP. XIII.

Of FERMENTATION *in* General, *in order to the Better Underſtanding of* ANIMAL FERMENTATIONS, *and the Motions of* ANIMAL FLUIDS.

Fermentation, why here treated of.

BEfore I proceed to give any Account of the *Production*, *Motions* and *Alterations* of any of the *Fluids* of a HUMAN Body, it will be neceſſary to premiſe ſomething concerning FERMENTATION, to which the *Generation*, *Perfection*, and *Decay* of ANIMAL Fluids has, by a Conſent almoſt General, been aſcrib'd.

Uſed equivocally by Authors.

FERMENTATION is a Word, that has been ſo much, and ſo variouſly uſed by Authors, that it is become very *Equivocal*, and the Foundation of many unneceſſary, unedifying Diſputes, meer *Logomachiæ*.

Reaſon *of the* Method *here follow'd.*

To obviate therefore any Miſapprehenſions or vain Conteſts hereafter, about the Meaning of a Word, which I ſhall have frequent occaſion to uſe, I am forced to have recourſe in this place to *Definitions* and *Diviſions*, a Method, though ſome may think it too *Formal*, and *Scholaſtick*, indiſpenſably neceſſary to avoid Cavils, and future Altercations about Words, which while I uſe them are my own, and which (having here ſufficiently taken care to explain what I would

TAB: XIII.

fig: 1.

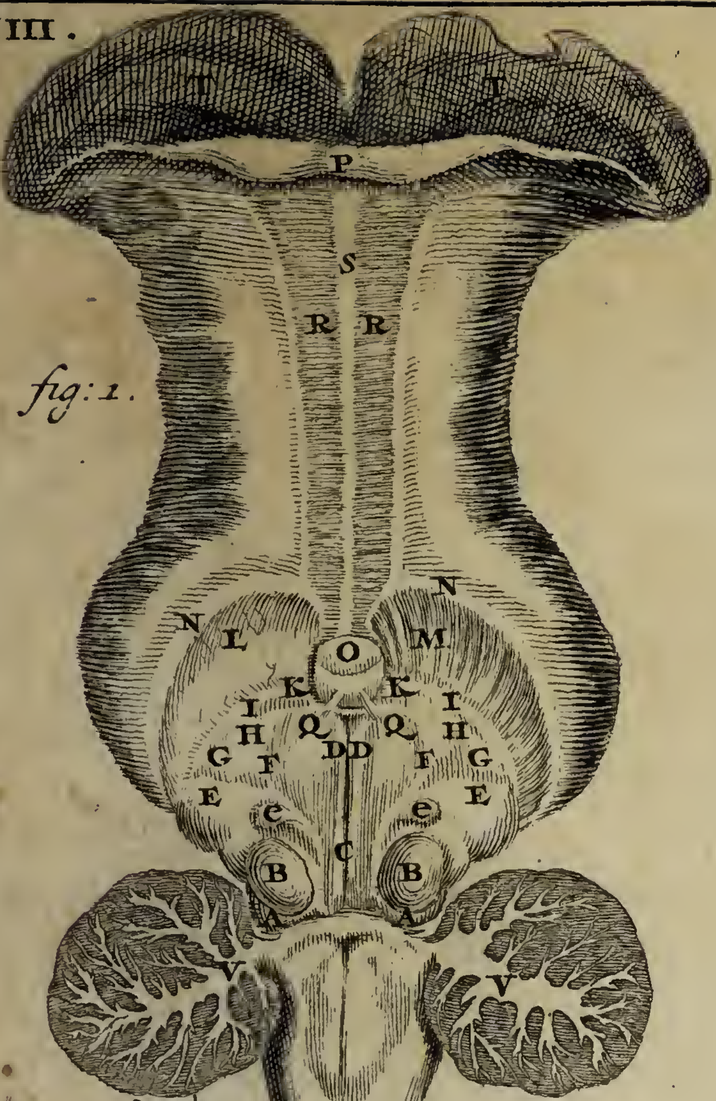
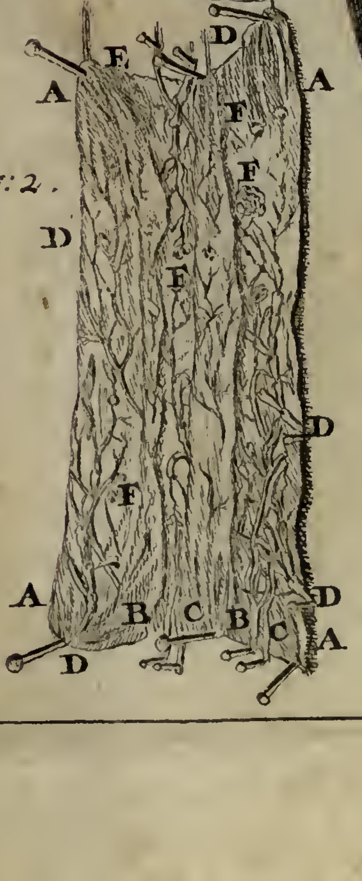


fig: 2.



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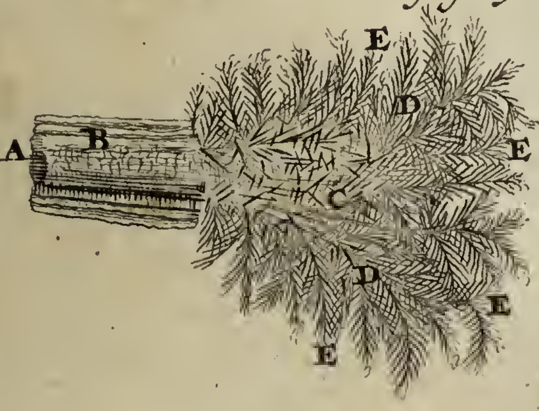

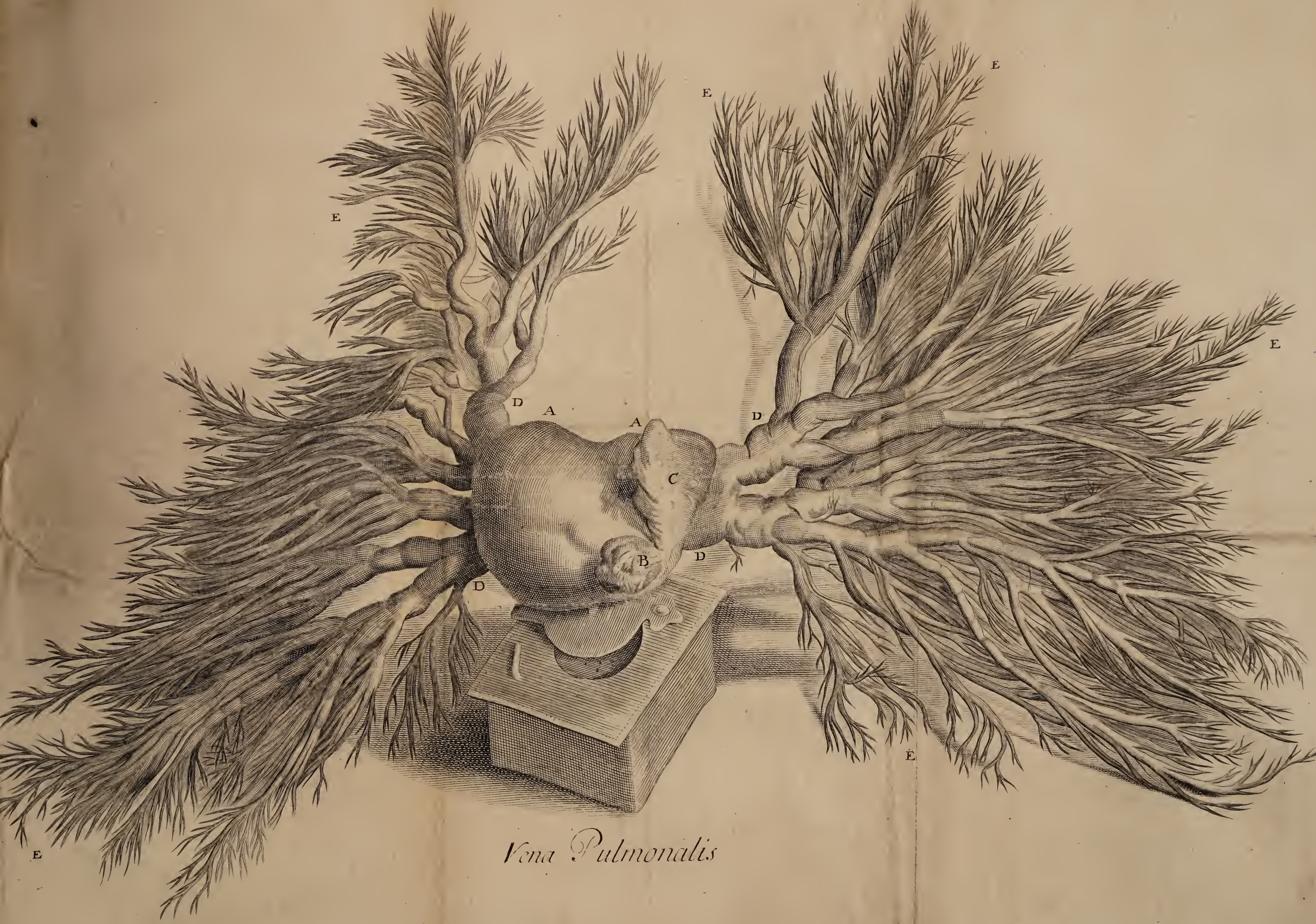

Vena Pulmonalis

M: V. Gucht Sculp:

I would have underſtood by them) I ſhall not trouble my ſelf to defend, if any one ſhall hereafter except againſt my uſage of them, or arraign me for Impropriety of Speech, my only care being to be underſtood, as I mean, which provided for, I leave Elegance and nice Propriety of Terms to thoſe, that ſtudy them for other Purpoſes.

Fermentation what.

'*By* FERMENTATION *in general, I* '*mean ſuch an Inteſtine Expanſive Motion of* '*the Conſtituent Parts of mix'd Bodies, as* '*tend to a permanent Alteration of the Body* '*fermented.*

Effervescencies or Ebullitions by Fire, no Fermentation.

By this I exclude all *Efferveſcencies*, *Ebullitions* or *Inteſtine Agitations* of Bodies, reputed *Simple* by Violence of *Fire*, or other *External* Heat, which leave them after cooling, in the ſame State they were before, ſuch as the Boyling of *Water* or *Milk*, the *Melting* of *Metals*, &c. For though in ſome of theſe, this Agitation from Fire will produce ſuch an Alteration in the Bodies, as will in cooling give the heavier parts leave to ſubſide firſt, and ſo leave on the upper Surface ſomething different, in Appearance, from the reſt of the Body; as in *Milk* the *Skim* or *Cream*, and in *Metals* unpurg'd, the *Recrementa* or *Droſs*. Yet this, in the Caſe of *Milk*, being no more than an Acceleration of that Separation, which, without this adventitious Force, would naturally have happen'd; and, in the other, ſuch a one as would never from any Prediſpoſition in the Body have arriv'd; they muſt both be look'd upon as violent Separations, not properly ariſing from the Diſpoſition of the mix'd, to which we reſtrain the Senſe of the Word FERMENTATION.

Fermentation promoted by Heat.

However as *Fire*, or any other *Heat* properly modify'd, ſerves to ſuſcitate, and promote in Bodies, naturally diſpos'd *true Fermentations*, as in *Muſt*, and other naturally *Fermenting* Liquors, the Heat of the Weather, or any other Analogous Artificial Heat will do, I only exclude thoſe, which are ſuddenly and violently produc'd by Fire. If any one will have thoſe I have excluded to be *true Fermentations*, I ſhall not contend with him, provided that as often as I mention *Fermentation* in this Work, he does not underſtand me of thoſe ſorts, it being none of my Intention to diſpute what may, or may not, properly be call'd *Fermentation*, but to ſettle my own Meaning only.

Alterations.

The *Alterations* produced by *Fermentation*, are in general Two: The *Union* of Bodies before diſtinct, or at leaſt the ſtricter *Incorporation* of ſuch as, though looſely mix'd, were before not well united; or the manifeſt *Separation* of ſuch as were before (as to ſenſe at leaſt) united and incorporated, and bore the Face of an uniform Body.

Fermentation produces ſometimes *Incorporation* by ſimple Solution only, wherein the Body, *leſs* Fluid, is diſſolv'd and ſuſtain'd by the *more* Fluid Body; and both together ſeem to make one Liquor or Subſtance. In this Caſe the Fluid ſuſtaining is generally call'd a *Menſtruum*, as in *Tinctures* of *Reſinous*, *Metallick*, and other Bodies. This is generally Artificial.

Simple Solutive Fermentation.

Artificial.

Sometimes this *Diſſolution* ſprings from a natural Tendency of theſe Bodies, to *Ferment* and ſeparate, or at leaſt to cohere more looſly than before, as in the PUTREFACTION of *Animal* and *Vegetable* Bodies; which is a degree of this *Solutive Fermentation*, that ſo intirely diſſolves the Union of the Parts, as to render them not only *Fætid*, but incapable of being ever reunited under the ſame Form, the more Volatile Parts being ſo diſingaged from the reſt, as to ſtrike the Organ of Smelling at ſome diſtance by their *Effluvia*, as all *Animal* Subſtances, if left to themſelves, will in ſome ſhort time do, and in ſome *Morbid* Caſes (beſides the Excrements which do it conſtantly) ſome parts of the *Living Animal*, as in *Ulcers*, *Apoſtemations*, &c. which *Effluvia*, ſo ſent out, are not to be recollected by Art.

Natural.

Putrefactive.

A Leſſer Degree of this ſort of *Fermentation*, which does not ſo abſolutely Enfranchiſe the Volatile Fœtid Parts, yet ſo far

Digeſtive.

ſar diſſolves the whole mix'd, as to looſen the Coherence of the Parts, and to diſpoſe them towards, or give them a Degree of Fluidity, which they had not before, without ſending out any Offenſive Exhalations, is call'd DIGESTION, and is that State to which the Aliment is reduced in the *Stomach* of *Animals*.

Depuratory.

There are other *Fermentations*, which are DEPURATORY, and ſeparate ſomething from the mix'd, without deſtroying the Form of it.

Deſpumatory *with a* Strong Efferveſcence.

This is done two ways, either by ſending a Permanent Froth or Scum, as new Wine, Ale, and other Fermented Liquors uſed for Drink, and is attended with a Strong and Laſting Efferveſcence, to which if Vent be not given, it burſts the Veſſels be they never ſo ſtrong, and is vulgarly call'd, *Working*, by Artiſts, DESPUMATION. This is either *Spontaneous* or *Natural*, or *Artificial* or *Forc'd*.

Precipitatory *with a* Gentle Efferveſcence.

The other is by PRECIPITATION, or letting fall ſome *Recrementitious* Parts, which is uſually the Conſequence of a Light *Fermentation* without much Tumult, in which ſome Parts, that before floated ſeparately in the Liquor, unite, and, growing too heavy to be ſuſtain'd in it, fall down to the bottom, leaving the Liquor clearer than before, as the *Lees* and *Tartar* of *Wines*. This is call'd FRETTING, and is attended with a ſlight a ſlight *Spumeſcence.* This too is ſometimes *Spontaneous*, ſometimes *Forc'd* by Art.

There is however another ſort of *Præcipitatory* FERMENTATION, which is attended with a more immediate and violent Effervеſcence, than any of the former. This happens not only between thoſe Bodies, which the *Chymiſts* are pleas'd to call *Acids* and *Alkalies*, (of which more anon) and is inſtantaneous, follows as ſoon as the Bodies touch one another, and ſometimes before they ſeem to do ſo, that is as ſoon as their *Effluvia* or *Exhalations* meet. Theſe are generally *Saline* Bodies, and when both of them happen to be in *Fluore*, they conſtitute thoſe Liquors which the *Artiſts* call *Spiritus Macri*, *Saline* or *Lean Spirits*, becauſe they ſuppoſe them deſtitute of *Sulphur* or *Oyl*, at leaſt they appear ſo to them, being not inflamable, which is their mark of *Sulphur*, however fallacious. To produce theſe COAGULATORY *Fermentations*, one, at leaſt, of the Bodies muſt be a Lean Spirit, if both be ſo, a violent Ebullition is produc'd immediately upon their mixture, which ſoon ceaſing, a COAGULATE *Salt* compounded, and partaking of both, is let fall to the bottom, as TARTAR VITRIOLATE from *Oyl* of *Vitriol* and *Oyl* of *Tartar.*

Coagulatory.

Coagulation from Fluids.

From Fluid and Solid.

If the *Alkalious* be a dry Body, whether *Teſtaceous* or *Saline*, the *Acid* let fall upon it raiſes an immediate and conſiderable Efferveſcence, tho' not ſo great and violent as between the Fluids, yet greater with the *Saline* than the *Teſtaceous*, and more durable with both, than between the Fluids. When the *Acid* Salt has inſinuated it ſelf into the Body of the *Alkali*, the Ebullition ceaſes, and a mixt or *Neuter* Body is form'd out of them, which manner of concorporating different fermenting Bodies, is, by the *Chymiſts*, likewiſe call'd COAGULATION, as the MAGISTERY of *Pearl* from Powder of *Pearl* and *Vinegar*, or any other *Acid*.

Anomalous Fermentations.

There are divers other ſorts of FERMENTATION not reducible to any of theſe Heads, which it wou'd be endleſs to enumerate, they appearing to be almoſt as various, and numerous as the ſeveral Bodies that will ferment with one another. But the effects of moſt of theſe Fermentations ending with the Act, *viz.* neither producing any *Deſpumation*, *Precipitation*, *Coagulation*, or any other ſeparation, or other permanent Alteration whatſoever, other than ſimple mixture wou'd do, it may be ſufficient to mention the principal accidents that attend ſeveral of them during the Activity of their *Ferments*. Theſe may be call'd ANOMALOUS FERMENTS, ſince they are not to be brought under any certain *Claſſis*, or Rules.

In Bread.

Among theſe ANOMALOUS kinds may be reckon'd that *Fermentation*, which is rais'd in *Dough* by *Yeaſt*, or *Leven*: In which, altho' there be a notable Intumeſcence or Swelling of the *Maſs*, yet it produces no other conſiderable alteration in the Property. Neither is that laſting, unleſs the Maſs be bak'd in an Oven, or otherwiſe harden'd by the Fire, which hinders the Parts from ſubſiding again, as (left to themſelves) they naturally wou'd do. *Bread* is indeed accounted the more *Wholſome*, and eaſie of *Digeſtion* for this *Fermentation*, whence ſome wou'd infer an eſſential alteration in the Qualities of the *Maſs*. But that is a miſtake. For that Lightneſs and Eaſineſs of Digeſtion is altogether owing to the *Rarity* of the *Texture* introduc'd by the *Leven* or *Ferment*, aſſiſted and promoted by the Heat, whence the Parts touching one another in fewer and ſmaller Surfaces, become more eaſily ſeparable in the *Stomach*.

Venice Treacle, &c.

Of the ſame kind is the *Fermentation* of ſome *Pharmacopœal Preparations* made of a mixture of *Ingredients*, ſome *Aromatick* and *Volatile*, others *Viſcous*, whoſe Intumeſcence ariſing from a *Tendency* of the *Volatile Parts* to eſcape thro' the *Viſcous*, is not attended with any ſeparation, or other manifeſt Alteration of the Qualities of the Mixture, which after the Fermentation is over (being well agitated, as ſuch Preparations uſually are) bear one uniform Face, as other *Officinal* Unfermented Electuaries do. Of this ſort are *Venice Treacle*, the *Philonia*, &c. made with Honey or other viſcous Fermentative Subſtances. Theſe *Fermentations* being ſluggiſh, tho' the Intumeſcence be great, produce no very notable degree of Heat.

Flame *kindled by* Fermentation.

There are other *Anomalous* FERMENTATIONS, which tend neither to the Perfection nor Union of the Bodies Fermenting, yet are attended with a prodigious Ebullition, and moſt intenſe Heat, even to ACTUAL INFLAMMATION between ſome of 'em, as between ſtrong *Aqua Fortis*, or *Spirit* of *Nitre*, and *Rectified Oyl* of *Turpentine*, or *Diſtilled Oyl* of *Cloves*, &c. which end in the Deſtruction of the Subject, leaving nothing but a *Calx* behind. An ACTUAL FLAME, or *Conſuming Fire*, is ſometimes likewiſe produc'd by *Occult* or *Smother'd Fermentations*, as Country-men to their Loſs, Experience, when their new Hay is made up into great Cocks, or Rikes, before it be well dried.

Intenſe Heat *without* Ebullition.

An INTENSE HEAT may likewiſe be produc'd by a *Fermentation* without any very viſible Efferveſcence, as when *Oyl* of *Vitriol* is mixt with *Water*, which will heat

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a Glaſs or Metalline Cup ſo as not to be endured by the naked Hand, yet without any Ebullition. The ſame, or indeed much greater, Heat it produces pour'd upon *Spirit* of *Wine* (with the ſame appearance, except a change in Colour) and upon *Vinegar*, and moſt of the *Acids* of the *Lower* Claſs.

Various Hypotheſes.

To ſolve the great variety of different Appearances, ariſing from the ſeveral ſorts of FERMENTATIONS, *Hypotheſes* almoſt innumerable have been fram'd, which their Authors have endeavour'd to accommodate to the many ſurprizing *Phænomena*, which this one part alone of Natural Mechaniſm furniſhes.

Unſatisfactory.

But with how little Succeſs they have generally attempted theſe Difficulties, as it may perhaps be thought Arrogance in me to ſay of the Labours of Men ſo eminent and ſo much more able, than my ſelf, ſo it muſt be Ignorance in me unpardonable not to know, ſince by the nature of my Undertaking I am oblig'd to offer my own Senſe concerning 'em (unleſs I cou'd acquieſce intirely in any thing already laid down) tho' perhaps what I ſhall offer may only add to the heap of exploded Opinions.

The narrow limits to which I am in this Place circumſcrib'd, favour my Inclination (and perhaps my Weakneſs too) not to enter the Liſts too far againſt Great Men, to whoſe Inſtructions I readily and cheerfully ſubmit as far, as my yet greater Deference to Truth will permit, *& quouſq; libere Philoſophantem decet.* I am not here ſolemnly, or formally laying down a compleat *Theory* of *Fermentation* ; nor oblig'd to refute ev'ry *Hypotheſis*, which I may think to be inſufficient,nor even ſo much as to account for all thoſe different *Phænomena*, which I have already mention'd: But for thoſe only, which I believe to have a ſhare in the ANIMAL OECONOMY, and eſpecially in thoſe Parts of it, of which I ſhall be obliged to ſpeak in treating of thoſe *Problems*, which to me ſeem neceſſary to this Work. Herein I ſhall avoid all unneceſſary Offence either to Authors Living, or the juſt Admirers of thoſe, that are Dead; and therefore ſhall ſpeak to ſuch Opinions only, as ſeem to be moſt accepted, without deſcending to Arraign Authors or Abettors by particular Quotations, which are uſually offenſive to the Living, when contraverted, and injurious to the Dead, who can't explain themſelves any farther, if miſtaken.

Two General Hypotheſes, Corpuſcularian *and* Chymical.

Common Conſent of *Phyſicians* and *Naturaliſts* has, in a manner, reduc'd the *General Theory* of *Fermentation* to two HYPOTHESES; one deſcended from the Doctrines of *Democritus*, *Epicurus*, and their later Followers; the other from *Paracelſus*, *Helmont*, and the Modern *Chymiſts*.

Epicurean *or* Atomiſt's *Account.*

The firſt pretend to ſolve all the Difficulties occuring in this part (which is none of the leaſt, or moſt intelligible) of Phyſical Knowledge by the Concourſe, and Agreement or Diſagreement of *Atomes*, (which according to them are the *Seeds* of all *Natural* Bodies, and *Principles* of all *Phyſical* Action) floating in the *Atmoſphere*, and which by their fortuitous Concurrence either unite and ſettle quietly, or by their Contranitency and Reluctance occaſion all theſe Natural Buſtles, of which I have been ſpeaking, which the Diverſity, Contrariety, and Infinity of theſe *Seeds*, or *Principles*, they think make not hard to be conceiv'd.

Carteſian.

The *Carteſian* Notion (which moſt of the *French* Philoſophers embrace in this Point at leaſt) is a Refinement upon the foregoing, and eſtabliſhes a SUBTIL MATTER or ÆTHER, which having a conſtant *Rapid* Motion, pervades the Pores of all Bodies *Fluid* or *Solid*, *Diaphanous*, or *Opake*, and, while the Pores of the pervaded Bodies keep their wonted Station and Diſpoſition, the *Æther* paſſes ſwiftly, but quietly thro' 'em without ruffling or diſcompoſing the Body, however Fluid and eaſily diſturb'd. But if by Mixture or other accidental means the Courſe of theſe Pores be ſo interrupted and broken, as to create any Obſtacle to the Paſſage of the *Subtil Matter*, it raiſes Commotions *gentle*, or *violent*, till it has open'd a *free* Paſſage for it ſelf, or has rent the Body to Pieces. This Doctrine they Illuſtrate by the celebrated Inſtance of the *Glaſs Drops*, which by breaking off the Tip are ſhatter'd into a Million of Pieces in an inſtant.

Corpuſcularian *too* General *but not* Abſurd.

Tho' neither of theſe Opinions contain any thing abſurd, or that can be demonſtrated to be untrue, yet without offence to Modeſty I may ſay they are unſatisfactory, as being too *general*, and *abſtracted*, even ſo far as to be alike applicable to every Phœnomenon and in equal Degree, which will not anſwer particular Circumſtances. For if I be ask'd, why *Yeaſt* mixt with *Ale*, or *Dough*, makes 'em Swell or Ferment; according to the *Atomiſt*'s *Hypotheſis*, I muſt anſwer, that the Intumeſcence ſprings from the jarring or diſagreement of *Atomes*, that can't lie quietly together: According to the *Carteſian*, that the continuity of the Pores being by this mixture broken, the Tumult is rais'd by the *Æther*, which is ſeeking or forcing a new Paſſage. But what is the *diſagreement* of the *Atomes*, or *interruption* of the *Pores*, and wherein it conſiſts, and why the *Fermentation* is in one caſe *Haſty*, *Violent*, and *Short*, in another *Slow*, *Languid*, and *Durable*, are Queſtions that theſe *Abſtracted Theories* make no anſwer to. And when thoſe, that Philoſophize from 'em, undertake to do it, their Anſwers are generally ſuch as have no dependance upon their *Theories*, or ſo *Precarious*, or *Arbitrary*, as a judicious Inquirer can't acquieſce in, and he might as well take up with the old *Peripatetic* Juggle of *Sympathy* and *Antipathy*, which he might deal about and diſtribute, as in his Diſcretion he ſhou'd think fit.

Chymical not more ſatisfactory

By the great number and variety of *Experiments* which the *Laboratory* and *Furnace* ſupply, the *Chymiſts*, or as they affect to call themſelves the *Philoſophers* by *Fire*, ſeem better furniſh'd for an Argument of this kind than any others. But howſoever it has fallen out, whether through the Arrogance or affected Obſcurity of ſome, and the ſlender Literature of others, which have render'd them unfit for a free and rational Philoſophy. They have been no happier than the reſt, though more conceited, and have generally reaſon'd about the *Phænomena*, which they ſaw, rather like ſervile *Operarators*, than great minded *Philoſophizers*.

Inſufficiency of Eſſences, Archæus, Gas, Blas, *&c.*

The ESSENCES of *Paracelſus*, the ARCHÆUS, GAS, BLAS, *&c.* of *Van Helmont*, notwithſtanding all their Boaſts, give us as little Light into the Nature of Things, as the occult Qualities of *Ariſtotle*, and in ſpight of their barbarous

Cant, which as a *Veil* they wou'd throw over their Ignorance, and their affected Myſteries, by which they wou'd paſs for profoundly Knowing and Reſerv'd; we may ſee their real defects, and that they grop'd about as much in the Dark, as others whom they ſuperciliouſly overlook'd.

Narrow *and Abſurd*

The SALT SULPHUR and MERCURY of ſome, and the *five Principles* of others, which are the ſame with the former, with the addition of PHLEGM, and CAPUT MORTUUM only, by themſelves confeſs'd to be unactive, are too narrow a Bottom, to build a ſolid and ſubſtantial *Philoſophy* upon, as the Honourable Mr. *Boyle* has ſufficiently demonſtrated in his *Sceptical Chymiſt*. Much leſs then are we to hope for *univerſal Solutions* of *Problems* of this Nature from thoſe that abridge them yet farther, and reſolve all into ACID and ALKALI.

The wretched Shifts which theſe *Pyrotechnites* make, and the haſty Concluſions they draw from a few ill underſtood Experiments, are ſufficient to give a Man a Surfeit of ſuch awkard *Philoſophy*.

But were theſe Men qualify'd with ſufficient Learning and a liberal Education, yet were it impoſſible for them, upon *their* Principles, to arrive at any conſiderable degree of *Natural* Knowledge, or to know any thing more than their Eyes wou'd inform them of, without any uſe of Brains.

For taking their Principles in the largeſt Extent including their *Spirit* (or *Mercury*) *Salt*, *Sulphur*, *Water* and *Earth*, as they call their *Phlegm* and *Caput Mortuum.* It is impoſſible for any Man to make any Progreſs in real Knowledge upon them. Nor is the multitude of *Phænomena* which the *Laboratories* of ſuch Men produce any Argument againſt what is here advanc'd: Nor any proof of their Skill, any more than a Blind Man's throwing Stones, and hitting ſeveral People in a Croud, is an Argument of the exactneſs of his Aim. They have indeed nam'd ſeveral ſorts of Bodies, which they wou'd have not only to be *Generical*, but the *Real* and *Univerſal* Materials of all other Bodies. If they were ſo, wou'd the certainty of that inform us how, and in what manner and proportion they were mixt, and acted upon one another, ſo as to produce the vaſt variety of *Beings*, *Animate* and *In-animate*, and their ſeveral Properties which offer themſelves to our Conſideration? No! they are ſo far from that, that thoſe Bodies, which they call *Principles*, and which to deſerve that Name ſhou'd be the moſt *Simple* in *Nature*, are ſo variouſly *compounded* and *decompounded* even to Indefinity, that they who uſe the terms in *Common* have not one

Unedifying if True.

common Meaning, but are forc'd when they Talk or Write to one another of thoſe Matters, to allow a vaſt Latitude of Conſtruction, and perhaps it is not once in ten times when they Diſcourſe of their Principles, eſpecially if they apply them to the Solutions of particular *Phænomena*, that the *Speaker* and the *Hearer* underſtand their Terms ſtrictly alike, how much ſoever they may ſeem agreed.

Terms Equivocal. For Example, the *Chymiſts* agree in making *Sulphur* the Ground and Cauſe of *Smell* and *Colour:* A Notion founded upon a ſlight Experience, that ſome *Vegetable (Eſſential* as they affect to call them) *Oyls* carry the *Smell*, and will ſometimes upon Mixture with other Things impart the Colour likewiſe of the Plant or Flower from which they were drawn, yet they have never been able to ſettle their *Idea* of *Sulphur*, or to come to any generally allow'd Determination, what Bodies they comprehend under that Name, and what they Exclude, ſo that they have aſſign'd Properties and Functions to they don't know what.

Solutions Evaſive. However upon this, and other Terms altogether as EQUIVOCAL and uncertain, they found *all* their *Theory*, which is in all their Writings arbitrary and precarious. Ask any of theſe *Philoſophers* by *Fire* to account for the *Colour* and *Smell* of a *Roſe*, a *Roſe*, he will tell you that they ſpring from the *Sulphur*; and ask him why ſometimes the *Smell* is more vigorous or languid than at others, and he will anſwer that it comes from the *Exaltation* or *Depreſſion* of the *Sulphur*: But ask him what *Sulphur* in general is, and you ſhall either have no Anſwer at all to it, or that it is an *unctuous inflammable Subſtance*, by which Anſwer you are never the nearer the end of your Queſtion: For if you demand further how *Unctuoſity* and *Inflammability* contribute to the Production of *Colour* or *Odour*, he is at the end of his Line, and you muſt reſt contented with his Word, *that they do*, without any further inquiry into the *Modus*. If at any time you produce them any very high colour'd or odorous Body, which by all the Torture of their Art, will not afford any *unctuous inflammable* Subſtance, they will however poſitively tell you, that it is there conceal'd in the *Concrete*, tho' they are not able to Extract it, and rather blame, and condemn their Art than their own Reaſoning: Neither will they allow it to be any Argument againſt them, that a great number of Bodies, which have the *Characteriſtick Mark* of *Sulphur* in the higheſt degree, have very little *Colour*, and no *Scent*, as *Oyl* of *Olives*, and abundance of others, which are Tranſparent, and pretty near Limpid, and will burn till they are quite conſum'd, without affording any conſiderable *Smell.* Even that particular Body, from which they denominate this pretended *Principle*, is not it ſelf an unctuous Subſtance, nor does it upon the *Analyſis* yield any. That which the *Chymiſts* call *Oyl* of *Sulphur* is an Acid Liquor, neither *Unctuous* nor *Inflammable*; ſo arbitrary and unaccurate are they in their *Terms.* Beſides this there are multitudes of other *Concretes*, which they call *Sulphureous*, that do not anſwer both their *Teſts*, and many neither of 'em, which it wou'd be endleſs, and beſides our Purpoſe to name.

Principles *of the* Chymiſts *equally Exceptionable.*

I have not choſen out this, as more liable to Exception than the reſt: Any of thoſe, which they call the Active *Principles*, wou'd have afforded me as ample a Field. For there is not one of them under which they do not comprehend a thouſand Bodies of different Natures, of which many are abſolutely Repugnant to, and Deſtructive of one another, as manifeſtly appears from the mixture of different *Salts*, in which both *Acids* and *Alkalies* loſe their ſeparate Properties, and are confounded in a Subſtance, which they have been pleas'd to call *Neuter*, for want of Skill to range, and claſs them. Tho' abundance of that kind be of Natures own Production, as *Sal Armoniack*, which is both *Natural* and *Artificial.*

The ſame may be ſaid of their MERCURY or SPIRIT, by which they underſtand every thing that is *Volatile*: How contrary ſoever to one another the ſeveral *Species* may be, as *Spirit* of *Hartſhorn*, and *Nitre*, and innumerable others, which mixt together, produce the moſt violent Effervefcences, that we know, and in the end deſtroy the diſtinguiſhing Properties of one another.

Include under the ſame Principle *Things* naturally Oppoſite *and* Deſtructive *of each other.*

Notwithſtanding this narrowneſs of the *Chymical Principles* in their largeſt Extent, there have ſome ariſen, who wou'd reduce them yet to ſtraiter Limits, and ſolve all *Phænomena* by *Acids* and *Alcalies*, under which they pretend to Claſs all Bodies whatſoever, *Mineral*, *Vegetable*, or *Animal*. This *Hypotheſis* has all the Imperfections of the former, and thouſands more. But not to give our ſelves much trouble about it, it has one *Fundamental Flaw*, which like a *Conſtitution-Diſtemper*, will not ſuffer it to be long-liv'd, which is, that what *Acid* is, or what *Alkali* none of its Favourers have ever yet been ſtrictly able to Define, but have been forc'd to ſhuffle the ſame Body from one Claſs to another, as occaſion requir'd. Thus *Vinegar*, when pour'd upon any *Teſtaceous* Body, is reckon'd by them an *Acid*, becauſe it raiſes an Effervefcence. But when *Oyl* of *Vitriol* is pour'd upon it, and an inſufferable Heat is thereby

Crampt yet more by the Hypotheſis *of* Acid *and* Alcali.

Thoſe Terms Vague, *and* Indefinite.

by produc'd, it is according to them an *Alkali*, to preſerve their *Hypotheſis*, which ſuppoſes a neceſſity of an *Acid* and *Alkali* in all *Fermentations*.

Calculated (but unskilfully) to ſolve the Phænomena *of* Fermentation.

This *Hypotheſis* is the Product of the *Laboratory*, and calculated for this one *Phænomenon* of *Fermentation* only, and as it is the Off-ſpring of weak unskilful Parents, ſo is it infirm and inſufficient for that ſingle End, of which its *Favourers* have been made ſo often ſenſible, that many of them, when they are preſs'd to define what they mean by the Terms, ſay, that an ACID *is that which will ferment with an* Alkali; and an ALCALI, *that which will ferment with an* Acid. Thoſe, that have had the Addreſs to avoid being ſo far preſs'd, are however as arbitrary in their Accounts, and call this an *Acid*, and that an *Alkali*, juſt as the occaſion requires, without aſſigning any Reaſon why they Range them under thoſe Heads, but that in their Opinion, they muſt be both there, otherwiſe there cou'd be no *Fermentation* and he that will be ſo gracious as to allow that, may in many Caſes make, which he pleaſes, the *Acid* or the *Alcali*, without any Oppoſition from them.

Crept too far into Phyſick.

It had ſcarce been worth while to have taken ſo much notice of theſe abſurd Opinions, had they not crept ſo far into *Phyſick*, as to pervert the Underſtandings, and debauch the Reaſonings, of many who otherwiſe might have employ'd their Talents to good purpoſe, and given opportunity to Impudent *Quacks* and *Empericks* to prate about things they did not underſtand, and banter the People with *Cant* without Reaſon.

Chymiſtry, *rightly applied, of great Uſe in* Phyſick.

There is no doubt but *Chymiſtry* affords very great additions to, and improvements of the ART of HEALING and the THEORY of PHYSICK, and that thoſe who are Ingenuouſly and Honeſtly Converſant in the *Laboratory*, have opportunities of making many Luciferous Obſervations, when their Thoughts are not cramp'd and confin'd to the Furnace, which has ſent into the World ſo many Scandalous *Empericks*, who truſting to a few preſtigious Tricks, which that has taught them, have impos'd upon the leſs conſidering Part of Mankind, who (eaſily believing, that they who cou'd do things to them ſo ſurprizing, were Maſters of all the Secrets they boaſted of) have to their Peril confided in 'em upon ſuch Reaſonings. Tho' they might as well have attempted to account for all the *Motions* of a *Clock*, by *Acid* and *Alkali*, or *Salt*, *Sulphur* and *Mercury*, as what they pretended to.

The

Overſight of the Chymiſts *in the firſt Settlement of the* Number *of their* Principles.

The Founders of the *Chymical Phyloſophy* were certainly very unwary in circumſcribing themſelves to ſuch *Narrow Principles*. For any Reaſon that appears to the contrary they might have allow'd themſelves *five Hundred* as well as *Five*, by which means they wou'd have avoided thoſe miſerable Shifts they have been put to, to ſave the appearance of their Principles: Nor need they have rank'd Bodies directly oppoſite, and deſtructive of one another under the ſame Claſs, as they are frequently forc'd to do. When we conſider what a variety of *Hypoſtatical Principles* there are, which their Simplicity (as to Senſe and our *Analyſis)* may make warrantably paſs for *Second* or *Subaltern Principles*, (higher than which, a *Chymiſt* cannot Mount, becauſe his *Laboratory* cannot inform him farther) it is matter of juſt Wonder why they ſhou'd reſtrain themſelves, when they might have taken a warrantable Liberty, and been juſtify'd by the Productions of their *Furnaces*. They cou'd not but know, that many of thoſe Bodies, which they call *Mercury* or *Spirit*, were as eſſentially diſtinguiſh'd from one another, and by as indelible *Characters*, as SULPHUR is from SALT, or *Salt* from MERCURY, and ſo on. Had they therefore enlarg'd the number of their Principles, and not requir'd them all or any ſtated Number of 'em in every Body, they had taken away from their Oppoſers innumerable occaſions of Triumph, which upon the preſent Foot are unavoidable.

Their Claſſes *contain Bodies of differing and repugnant Qualities under the ſame* Denomination.

That *Principle* alone, which they call MERCURY or *Spirit*, includes divers *Species* of Bodies, which nothing but the arbitrary Humour of ſuch *Chymiſts* cou'd reconcile to one Head. The volatile *Acid*, and *Alkalious Spirits* are not only different, but oppoſite: The *Vinous inflammable Spirit* is ſpecifically different from either of them, and there is another *Vegetable Spirit*, which has not yet receiv'd a *Claſſick* Name, that differs as much from them all, and is neither manifeſtly *Acid*, *Alkalious*, *Vinous* nor *Inflammable*, and yet is a very *Brisk*, *Active Spirit*, will Ferment very durably with *Spirit* of *Nitre*, yet not ſo much as turn the Colour of *Syrup* of *Violets* either way. I mean that ſort of *Spirit*, which is drawn from *Scurvy-Graſs*, *Horſe-Radiſh*, and all that *Tribe* of *Biting Plants*: And there may be a great many more as ſpecifically diſtinct, if their Properties were nicely inquir'd into, which this unaccurate way of Claſſing has confounded in the General Maſs. Even among the very manifeſt *Acids* themſelves, and the ſtrongeſt of them, we find very conſiderable Differences, which ſeem not to be owing to their *Acidity*, but to ſome other Qualities yet no otherwiſe diſcover'd, than by the Properties which flow from them: Thus *Aqua Fortis* will diſſolve *Silver*, and not *Gold*, and *Aqua Regia* will diſſolve *Gold*, yet not touch *Silver*: And *Oyl* of *Vitriol*, which ſeems to be as high an *Acid* as either of them, will not act upon either, but will diſſolve *Iron* more readily than they. This evidently ſhews that thoſe Qualities, which the *Chymiſts* ordinarily aſſign as the *Diſtinguiſhing* and *Characteriſtick Marks*, do not ſufficiently diſcover their Properties and natural Relations to one another, and that conſequently a more accurate Diviſion is neceſſary to make 'em ſo uſeful, as the *Chymiſts* wou'd pretend, and without any vain Exaggeration they might really be, if conſider'd as they ought.

Salts *not diſtinctly enough, and Claſs'd.*

The ſame may be ſaid of their SALTS, under which Head they Claſs all ſorts of Bodies that are *Sapid*, and *Soluble in Water*, whatſoever Contrariety or Repugnancy they may have to one another in their own Natures. Theſe perhaps are the moſt reaſonably claſs'd of all their pretended Principles, notwithſtanding the variety and difference that is to be found among them, becauſe they anſwer the Generical *Tryal* and *Taſte* more uniformly than the reſt of their *Active Principles*. But when they come to make it a *Principle* or *Producer* of many of thoſe Qualities, which they pretend to fetch from it, they argue as abſurdly, ly, as from any other part of their *Philoſophical Romance.*

Their other two (PHLEGM and CAPUT MORTUUM) which are by all of them reckon'd as unactive, and therefore by many thrown out of the Liſt of *Principles*, are liable to as many Exceptions in proportion to the Uſe they make of them. But it is not proper to ſpin out this Digreſſion any farther. They that believe what I have already ſaid againſt their *Principles* to be reaſonable, will be ſatisfy'd with that. They that do not, will require more Conviction than my Deſign gives me room for here, and muſt have Recourſe to thoſe Authors that Treat expreſly on this Subject, and will undoubtedly, if they be unprejudic'd, find it in that Elaborate Piece of the Learned and Ingenious Mr. B*oyle*, call'd the *Sceptical Chymiſt.*

Phlegm *and* Caput Mortuum, *obnoxious to the ſame Exceptions.*

Vide, Sceptical Chymiſt *of Mr.* Boyle.

That the Reſolution of Bodies into their *Viſible Elements*, or the moſt *Simple Parts*, that hitherto Art has ſuggeſted any way to find, is of great Uſe to *Phyſicians*, is paſt Controverſy, as well from the conſtant Uſe which Phyſicians both in their *Theory* and *Practice* make of ſuch Bodies, as from the neceſſity they have of Recourſe to ſuch Things as they can upon occaſion produce and apply, with ſome knowledge of their Operations and Effects. For tho' thoſe Bodies be not ſo abſolutely Simple as in

Chymical *as* Subaltern *or* ſecond Principles *of* Great Uſe *in all Parts of* Natural Philoſophy, *eſpecially* Phyſick.

in *Natural Philoſophy*, to deſerve the Name of *Firſt Principles:* Yet ſince they have ſuch conſtant, and regular Effects, as we are not able to prevent without firſt corrupting them, and are the *Ultimate Reſults* of the minuteſt *Analyſis* we have been hitherto able to make, they may very well be reaſon'd upon as *Subaltern* or *Second Principles*, which are the Inſtruments that *Phyſicians* muſt uſe, who are not able to govern *Matter* and *Form*, or *Matter* and *Motion*, abſtractedly conſider'd; which tho' they may afford pleaſing *Speculations*, and perhaps true ones too, are not reducible to *Practice* and *Experiment*, and therefore of no real Benefit to Mankind, without the Intervention of ſome ſuch intermediate Principles as theſe.

Neceſſity of a more Accurate Diſpoſition of Natu*ral Bodies into yet* Nicer Claſſes.

It wou'd therefore be a very great Service to all ſorts of *Mechanical Operations*, to redeem theſe *Second Principles* from that Obſcurity and Perplexity into which the *Chymical Philoſophers* have either thro' want of Judgment or Ingenuity, plung'd them: And perhaps by Claſſing theſe Bodies in appearance Simple in a clear Method, according to their ſeveral diſtinguiſhing Qualities, and Effects, many Doubts now very perplexing might be reſolv'd: And many Ends anſwer'd, which now remain as *Deſiderata*, as well in all other *Arts*, as in *Medicine*, which we hope will be ſufficient to induce thoſe who have

Means and Capacity to contribute their Endeavours to ſo neceſſary a Work for the relief of Human Infirmities; in which they will have the advantage to find the Field leſs pre-occupy'd, than in any other part of Natural Knowledge, and room enough for the Induſtry and Improvements of Ages yet to come.

Corpuſcularian Hypotheſis, *how too* General *and* Abſtracted.

But to return to the immediate Subject of this Chapter, *Fermentation*, which is (notwithſtanding the Endeavours of ſome to fling it out) one of the main Wheels of *Animal Oeconomy*; I have endeavour'd to ſhew that the CORPUSCULARIAN HYPOTHESIS is too *General*, and abſtracted to account ſatisfactorily for the *Phænomena* of *particular Fermentations*; however true it may be, that what is laid down in it is the Ground-work of all, and is no better a Direction in *Practice*, than it wou'd be to a *Traveller*, to tell him that *Rhoan* was a City in *France*. If he that was to go thither, had no better means of inquiring his way, 'tis probable he wou'd never get thither.

Chymical *wherein* Defective.

Chymiſtry, like a particular *Map*, ſeems to promiſe a more certain Direction in ſome Parts of *Phyſical* Knowledge. But (as it has been manag'd) like an ill *Map*, it points us only to ſome few conſpicuous Parts without any meaſur'd *Diſtances* or *Degrees* of *Longitude* and *Latitude* to guide us certainly ly in our Way, and leaves us to hunt out the Place we wou'd Arrive at, whether to ſtumble fortuitouſly upon it, or by immethodical Inquiries of I don't know whom, or how to find it out.

Great Obligations to Ingenuous Chymiſts.

We are indeed oblig'd to thoſe Ingenuous *Operators* in *Chymiſtry*, who without Bantering us with falſe Reaſonings, communicate to us what their Labours and Inquiries have made certain to them, and like thoſe honeſt Countrymen, who without *Clock*, *Watch*, or *Dyal*, look up to the Sun, and tell us, as near as they can gueſs, ſincerely what time of Day it is, which tho' we cannot depend upon to a Minute, will however ſerve us to Proportion our Speed by, if we know the Length of our Way. To the Hints, which ſuch *Chymiſts* afford, we owe all the Improvements, that have been made in the *Theory* of *Animal Fluids*, and tho' they are not often to be met with, one Chymiſt, of ſuch Ingenuity and Probity as Mr. *Moult*, makes Reparation for ten *Charlatans*, with all their vain affected *Myſteries* and miſchievous *Arcana*.

Having premis'd thus much concerning *Fermentation*, in order to remove ſuch Prejudices as have been entertain'd concerning it, and to ſhew the neceſſity of a more particular and leſs exceptionable *Rationale* of this ſurprizing Method, by which Nature works in the Production of moſt of her conſiderable *Animal* and *Vegetable* Phænonomena, it will be neceſſary for me to offer my own Thoughts, that when in reſolving many Problems of the Animal Oeconomy I reject the Solutions as not agreeing with verity of Fact, and reality of Circumſtances, I may not leave the Reader without ſomething (in my own Opinion at leaſt) applicable to both, and ſufficient for the Purpoſes to which I uſe 'em; of which I muſt leave the intelligent Reader to judge, and therefore beſpeak his Candour.

Exiſtence *of the Æ*ther *thought* probable *by the* Author.

And here it will not be improper to remind him, that, as I have no where denied the *Exiſtence* of the *Æther* of the *Corpuſcularians*, nor its Activity in the Production of this particular great Phænomenon *Fermentation*, but have thought their Solutions too ſlightly circumſtantiated to give any great Satisfaction or Light into a Part of Nature ſo abſtruſe, and to clear up all Doubts concerning it: So on the other hand I muſt frankly avow that many Circumſtances of this Phænomenon alone plead ſtrongly for the Exiſtence of ſome ſuch *Subtil* Bodies, which permeate all others with the utmoſt degree of Celerity and Rapidity imaginable, otherwiſe it wou'd be hard to account for that violent Motion, which is inſtantaneouſly produc'd between Bodies, that were (to appearance at leaſt) before quieſcent, eſpecially if *Nil dat quod non habet*, be in this Caſe a true Axiom.

Vain Confidence of the Chymiſts *in* Acid *and* Alkali.

The *Chymiſts* on the other ſide exult, and think the Power and Contrariety of their *Acids* and *Alkalies* ſufficiently demonſtrated; ſince from the commixture of thoſe oppoſite Bodies, that they range under theſe Heads, moſt of thoſe ſudden and violent Efferveſcences ariſe. Neither cou'd this *Fermentative* Oppoſition be denied to 'em, if they were contented to lay no more upon it, then it wou'd fairly bear. But, when they pretend their *Tria Prima*, their *Salt*, *Sulphur*, and *Mercury*, or even with the other two, *Water* and *Earth* added, to be the HYPOSTATICAL Principles of all Bodies, and the ſole Efficient Cauſes of all the Properties and Accidents, that belong to, or befall 'em, they give all thoſe, that are Ingenuouſly ſtudious of promoting real and true Natural Knowledge, juſt Provocation to refute and expoſe 'em. For to adjuſt all manner of *Phænomena* to the largeſt of their *Hypotheſes* we muſt confound all our Ideas of Natural Bodies, and range 'em ſometimes under one Principle, ſometimes under another directly oppoſite; as for Example. When the *Spirit* or *Phlegm* of *Vitriol* ferments with *Oyl* or *Salt* of *Tartar*, or *Spirit* or *Salt* of *Hartſhorn*, a HYPOSTATICAL *Chymiſt* will roundly call the *Spirit* of *Vitriol* an *Acid*, and the other

Not always to be found in Fermenting Bodies.

other Bodies *Alkalies.* But what will he call the ſame *Spirit* of *Vitriol*, when it Ferments with *Oyl* of *Vitriol*, another *Acid*, and not only ſo, but drawn from the ſame Body, by the ſame Operation, without any different Circumſtance neceſſary to produce it, but a little more Time, and Fire? The ſame may be ſaid of all their very high *Acids*, which will Ferment with a lower Claſs, tho' they differ, only *Secundum Magis & Minus*, no more than in Degree.

To be conſider'd as Inſtruments *of* Fermentation *only, and* Accidental.

Since therefore *Fermentations*, and thoſe not a few, may be rais'd without the neceſſary Colluctation of an *Acid* and an *Alkaly*, an Ingenuous *Chymiſt* wou'd lay 'em aſide, as no true *Principles* of *Fermentation*, and conſider 'em only as *Inſtruments*, which, whenever certainly both preſent, highly promoted that Operation, in which all Rational Inquiries muſt go along with him or reject indubitable Fact. But then he muſt go out of the Sphere of his own Activity, his Laboratory for it, to which the working Chymiſts have been generally ſo bigotted (upon the ſcore of ſome Searches, which they have uſually laid more to Heart, than the Improvement of ſound Philoſophy) that they have generally neglected all that was to be learnt without the Furnace, as not conducing to their End, and too ignoble for their Ambition or Avarice.

But

As ſuch, not repugnant to the Corpuſcularian Hypotheſis.

Defect of the Corpuſcularian Hypotheſis *of* Fermentation *without 'em.*

But whether *Chymiſts* will be ſo condeſcending, or not, the *Corpuſcularian* Principles are not ſo Strait-lac'd, but that they may to very good Uſe receive the *Chymical Acid*, and *Alkali* (ſo as not to make 'em *Hypoſtatical*, or the ſole Conſtituent Parts of all Bodies) and employ 'em with good Succeſs in the Solution of many Natural Phænomena, concerning which, they have been uſed to reaſon too abſtractedly and remotely to draw any very uſeful Practical Inferences from. Thus tho' a *Corpuſcularian* ſees a violent Fermentation rais'd between two Bodies, and imputes it to ſome Obſtruction thereby created to his Permeating *Æther*, yet he's at a Loſs for the reaſon of this Obſtruction, and why rather between the two Bodies before him, than ſome others that ſeem more likely to produce it.

Abſurdity of the Hypoſtatical

Receiv'd and reconcil'd in ſome Caſes by the Chymico-Corpuſcularian, *or Mr.* Boyle's Hypotheſis.

The *Hypoſtatical Chymiſt*, who from Experience knows, that thoſe Bodies do conſtantly and regularly exhibit thoſe appearances, is as much at Loſs why, but (without aſſigning any thing Mechanically capable of exciting ſuch Motions) abſurdly feigns *Natural Inclinations* and *Averſions* in *Inanimate* Bodies. But the *Corpuſcularian Chymiſt* who applies the *Mechanical* Principles to the Phænomena of the *Laboratory*, avoids both theſe Difficulties, as well immediate and particular, as remote and general, as the Honourable Mr. *Boyle* has very happily experienc'd, particularly on this Subject of *Fermentation*, by ſuppoſing the *Acid* to be *Sharp* or *Pointed* Bodies, like little Blades of Knives, and the *Alkalious* to be *Porous*, like ſmall Sheaths into which the *Acids* are forcibly driven by the rapid Stream of *Æther* conſtantly pervading both Bodies, tho' not in equal Meaſure, but in proportion to their Number, and Capacity of their reſpective Pores, which Agitation cauſes firſt a very furious Ebullition till the Pores of the Mixt are diſpos'd regularly for the Paſſage of the *Æther*, and next a *Præcipitation* or Subſidence of thoſe Parts, which being ingag'd mutually, or impacted into each other, grow ſpecifically heavier, than the Fluids which before ſuſtain'd 'em, and therefore after their *Coalition*, or (as the *Chymiſts* term it) COAGULATION, ſink down and leave a free Paſſage to the *Æther* thro' the mixt Liquor, which thenceforward remains to outward Appearance one uniform, homogeneous Fluid, where the *Coagulation* does not unite the whole Subſtance. Or otherwiſe the Parts of either Body are ſo minutely broken or mixt, as to Swim quietly together under one Form without *Præcipitation*, and are to appearance Uniform, tho' not Simple.

Which comprehends not all *kinds of* Fermentation.

But this way of Solution by a mixt *Chymico-Corpuſcularian Hypotheſis*, however Ingenuous and Rational, tho' it ſeems juſtly to take Place in thoſe *haſty Fermentations*, which are produc'd by the mixture of manifeſt *Acids* and *Alkalies*, leaves us yet ſome room to doubt its Sufficience, when applied to ſome other kinds of *Fermentation*, where the concurrence of an *Acid* and *Alkali* are not ſo evident. For tho' the violence of the Motion, and the ſuddenneſs of the Expanſion in ſuch *Fermentations* (as we have been juſt now treating of) ſeem to require the Activity of the *Æther*, (or ſome other Body of equally rapid Motion, and general Influence, which will as little fall under the Examination of our Senſes) to give Life to the *Acid* and *Alkali*, or other Principles of the *Chymiſts*, which whatever they dream of, or feign of their Activity, are of themſelves as Sluggiſh and Unactive, as thoſe they call ſo; and even their moſt viſibly *Active* Principle *Salt* is perfectly dead, unleſs invigorated and enliven'd by Solution in ſome of that *Phlegm*, which they ſo much deſpiſe: Yet there are ſome Fermentations to which it cannot be prov'd, that both theſe *Chymical* Principles concur, and ſome to which perhaps neither of 'em do; and whoſe leiſurely, unprovok'd, gentle Intumeſcence and Deſpumation ſeems not to need, much leſs to have, any ſuch violent forcible Agitation, as the Interruption of the Courſe of the *Æther* is preſumed to be attended with.

Active *Principles of the* Chymiſts *not ſo* ex ſua natura.

Of

Fermentations divided into Natural, *or* Spontaneous, Artificial *or* Violent

Of this leiſurely gentle kind, are all thoſe, which Nature uſes towards the Perfection of thoſe purpoſes wherein ſhe uſes this way of Operation, as in the *Maturation* of *Fruits*, and pure *Natural Liquors* made of their unmixt Juices, *&c.* which I ſhall therefore call *Natural* FERMENTATIONS, (according to a diſtinction already laid down) and thoſe, that ſhall proceed in a manner *Analogous* to theſe, *Spontaneous*, although they may happen to have been firſt produc'd, or afterwards promoted by Art, unleſs it be by the manifeſt Colluctance of *Acids* and *Alkalies*, all which I ſhall call *Artificial* or *Violent*, and have already accounted for in general, by the *Chymico-Corpuſcularian Hypotheſis* of that Noble Philoſopher Mr. *Boyle*, to whom all the Curious are eternally indebted.

Artificial *or* Violent Fermentations, *which.*

Under the *Artificial* or *Violent* FERMENTATIONS may be comprehended all thoſe, that ſpring from the mutual Action of a manifeſt *Acid* and *Alkali*, and ſome others, which (tho' the *Alkalious* Nature of that which is ſuppos'd to be the paſſive or leſs active Body might very well be conteſted) I range with 'em, becauſe of the ſhare which high *Acids* have in ſuch *Fermentations*, and that they are accountable for by the ſame *Hypotheſis*. Such are the Ebullitions rais'd in the Diſſolutions of *Gold*, *Silver*, *Copper*, *Iron*, *Lead*, *Quickſilver*, Metals, *&c.* *no Alkalies.*

ver, *Coral*, *Pearl*, &c. In *Aqua Regia*, *Aqua Fortis*, *Spirit* of *Nitre*, *Oyl* of *Vitriol*, *Spirit* of *Salt*, *Tartar*, *Alum*, *Juice* of *Lemons*, *Vinegar*, &c. the former of which *Metallick* and *Natural* Bodies, tho' the *Chymiſts* arbitrarily rank among the *Alkalies*, only becauſe they Ferment with, and are diſſolv'd by *Acids*, yet their Proceeding therein is very arbitrary, precarious, and without Authority; ſince all their Skill in *Analyſis* cou'd never fetch any thing directly *Alkalious* out of 'em. With more Juſtice might they have reckon'd *Nitre*, *Vitriol*, &c. among the *Alkalies*. For theſe will not only Ferment with each other, but with their own *Acid* Liquors, and over and above upon Incineration afford a true *Lixivial fixt Salt*. Yet theſe were ne'er accounted *Alkalies* by 'em. Perhaps upon the Score of their yielding ſuch an over-ballance of *Acid* on the Analyſis.

Nor Mineral Salts *yet both* Ferment *with Acids.*

Inflammatory Fermentations *with* Vegetable Eſſential Oyls.

Whether it may be altogether ſo reaſonable to exclude thoſe INFLAMMATORY Effervefcences, which ariſe from the pouring a highly rectified *Acid* upon the *Volatile Diſtill'd*, or (as they call 'em) *Eſſential Oyls* of *Vegetables*, from the number of thoſe caus'd by *Acid* and *Alkaly*, is ſomewhat more a Queſtion. For tho' theſe be what they call the *Sulphurs* of thoſe Bodies, and that *Sulphur* taken ſtrictly to their Meaning, be neither *Acid* nor *Alkaly*, as being a Principle, and as ſuch independent of *Acid* and *Alkali*, which are only two Claſſes of another Principle *(viz.) Salt*, yet the *Chymiſts* pretending that none of their Principles are to be extracted Pure, eſpecially *Sulphur*, may alledge (as they really do) that theſe *Sulphurs* are highly charg'd with the *Volatile Eſſential Salts* of the *Vegetables*, which they may ſay is *Alkalious*; and that tho' the *Actual Inflammation*, which enſues upon ſome ſuch Mixtures, proceeds from the *Sulphur*, which is their *Inflammable* Principle, the *Efferveſcence* is owing wholly to the Contrariety of the *Salts* of the two Liquors. But this is ſaying without proving, according to their uſual, arbitrary, unaccurate Way. And therefore till they plainly demonſtrate the *Volatile Salts* of *Plants* to be *Alkalious*, and to have ſuch an Antipathy to *Acids*; it will be ſafer to acquieſce in the General Solution, that the Parts of the *Acid* inſinuating themſelves in great Plenty into the Pores of the *Oyl*, the Paſſage of the *Æther* was ſo interrupted, as to occaſion an Exploſion ſo violent to diſlodge 'em, as was ſufficient to produce an *Actual* Flame, which catching hold on the *Oyl*, its moſt ordinary *Pabulum*, it continu'd till all the *Oyl* was conſum'd, but without any farther Ebullition or Exploſion, the Paſſage being clear'd at once. They that conſider how little countenance

Arbitrary, Precarious *ſhift of the* Chymiſts.

General Solution *the moſt proper to be* acquieſc'd *in*.

tenance the *Spirit* of *Scurvy-Graſs* gives to the *Alkaliouſneſs* of *Volatile Vegetable Salts*, will be apt to require more Proof than a *vulgar Chymiſts* bare Word.

Farther Particularities *of* Spirit *of* Scurvy-Graſs.

For beſides the Phænomena, I have already mention'd from that *Spirit* mixt with ſtrong *Spirit* of *Nitre*, it continu'd to ſend up numerous Bubbles, as often as I pull'd out the Cork for ſome Days, and retain'd both Smell and Taſte intire, tho' ſomewhat over-power'd by thoſe of the *Nitre*, yet very plainly to be diſcern'd thro' the other. The ſame thing it did, but more vigorouſly and plainly, mixt ſeverally with *Vinegar*, *Juice* of *Lemon* (but without any Effervеſcence, Heat, or Ebullition) and was taſted as freſh in 'em, tho' mixt with a much larger Quantity, as *Sugar* cou'd have been; the Smell in the mean time over-power'd thoſe of the *Vinegar*, or *Lemon* Juice, without deſtroying or damping either of 'em. So that the putting 'em together ſeem'd to have no other Effect, than that of ſimple Mixture. Theſe, and divers other Tryals, as well with *Alkalies*, as *Acids*, convinc'd me, that it belong'd to neither of thoſe Claſſes, ſince it neither deſtroy'd, nor was deſtroy'd by any of 'em. Till therefore I can be convinc'd what thoſe *Salts* are, which are ſuppos'd to float in Vegetable Eſſential Oyls, and what ſhare they have in theſe extraordinary Fermentations,

Proving it neither Alkali *nor* Acid.

tions, I ſhall content my ſelf with the foregoing Solution, and Range 'em among the Anomalous Fermentations of the *Chymico-Corpuſcularian Hypotheſis.*

Other Anomalous Fermentations why not accounted for here.

There are other *Anomalous Fermentations*, which are excited by the pouring of Corroſive *Acid* Liquors upon divers Bodies of very diſtinct kinds, which might be accounted for by the foregoing *Hypotheſis*; ſuch as thoſe between *Oyl* of *Vitriol*, *Spirit* of *Nitre*, *Aqua Fortis*, &c. and *Simple Water*, *Spirit of Wine*, *Spirit* of *Scurvy Graſs*, &c. of which it is ſufficient to my preſent purpoſe barely to have made mention. For, not deſigning a compleat *Hiſtory* and *Theory* of *Fermentation* at large; but ſuch a reſtrain'd one only as ſhould have regard to the *Theory* of *Animal Oeconomy*, I ſhall be particular only upon thoſe kinds, which either have been already uſed (how juſtly ſoever) to illuſtrate and explain ſome parts of the *Animal Oeconomy*, or hereafter probably may be put to that Uſe by my ſelf or Others. Having therefore ſpoken of the Principal *Fermentations* rais'd by high *corroſive Acids*, which I have therefore call'd *Artificial* or *Violent*, becauſe the main Inſtrument that produces 'em, is procured by great Art and Violence of Fire, I paſs over the reſt in hopes, that (if what in the courſe of this Work I ſhall have to ſay againſt ſuch ſort of Illuſtrations, be of any Weight) we

ſhall

ſhall not for the future be troubled with ſuch *Precarious Theories*, as will ſtand in need of ſuch Fallacious Supports.

By Natural *or* Spontaneous *what meant.*

I come now to thoſe gentle kinds of *Fermentation*, which I have ventur'd to call NATURAL, or SPONTANEOUS, not that I do not know that even theſe are ſometimes procur'd, and often promoted, by Humane Skill and Induſtry: But becauſe they work in ſuch a manner, as Nature her Self does in many of her Productions, and are urg'd on by ſuch Means as are of her furniſhing, or ſo much reſemble thoſe, that they ſeem as it were of her preſcribing.

Natural Fermentations *not illuſtrable by the Common Experiments of the* Chymiſts.

Leaving here the Laboratory and all its Pompous *Apparatus*, we muſt return into that of Nature, where every thing is perform'd by a Method and Inſtruments more Simple, and by a Mechaniſm therefore as much more wonderful, as its Effects ſurpaſs in Beauty, Variety, and Uſe, thoſe of Humane Art. Into this Field likewiſe the *Chymiſts* have attempted to thruſt their Sickle, and to limit the Operations of Nature to the narrow Principles of their Art, and to account for all the viſible Phœnomena in the three Kingdoms, into which (according to their Jargon) they divide the Terraqueous Globe, by their *Tria Prima*, or *Five* Principles, dividing as Arbitrarily among 'em the ſeveral Effects of

Nature, as if they had been the Authors, but with as little Judgment as if they were not rational Contemplators.

In the ſort of *Fermentations* I am now to ſpeak of, AIR is the *principal* Inſtrument, the *firſt* MOVER, in theſe neither the *Chymical* Principles, nor their *Acid* and *Alkali* have any thing to do. For tho' in many of the Bodies Fermented this way, ſome of their Principles, and ſometimes all may upon Analyſis be found, yet I think it pretty plain that neither they, nor their *Acid* and *Alkali* as ſuch, contribute any way to the Phœnomena produc'd.

Air *the Principal* Agent *or* Mover.

I ſhall not pretend to determine what ſhare the *Æther*, or *Materia Subtilis* of the *Corpuſcularians* or *Carteſians* may have; Becauſe I do not know how far that may enter the Compoſition of that Aggregate Fluid Body, which we call AIR. But I am apt to think that it has not much to do in in this ſort of Fermentations, otherwiſe than as it makes a part of the Compound.

AIR, of how many ſoever different ſorts of Particles or Atoms it may conſiſt, is agreed to be a *Springy Elaſtick* Body, *compreſſible it ſelf, and able by its Weight to compreſs others*, which are the only qualities neceſſary to the preſent purpoſe.

Air, *how Inſtrumental in* Fermentation.

Included in all Compreſſible Bodies.

It is farther found by Experience, that all ſorts of Bodies, whether *Fluid* or *Solid*, that are not too hard to yield to ſuch Tryals, as the Curious have been hitherto able to make, contain in 'em a greater or leſs Proportion of included *Air*. The *Torricellian* Experiments, and Mr. *Boyle*'s *Air-Pump* yet more amply, have ſufficiently demonſtrated, that even the moſt Denſe of *Fluids*, contain a conſiderable quantity of it, and that ſome Bodies reckon'd among the *Solids*, are not deſtitute of it: Though in theſe latter the proportion is not ſo eaſily found, becauſe theſe Bodies do not ſo readily yield to *Compreſſion* or *Elaſticity*. Yet that many of theſe do include no ſmall quantity, the diſſolution of *Bones*, made in Mr. *Papin's Digeſtor*, affords us reaſonable grounds to believe: Tho' the Materials, of which that Engine muſt neceſſarily be made, not being diaphanous, we cannot obſerve the Gradations or Steps made towards that Solution. But of this we ſhall have occaſion to ſpeak more hereafter.

Subſervient to Vegetation.

Divers Naturaliſts have offer'd curious Speculations concerning the *Vegetation* of *Plants*. Some have employ'd themſelves about the material Principle from which they receiv'd their Augmentation: Others about the Veſſels through which it was convey'd, and the means by which it was rais'd, Speculations which I have nothing to do withal here, any more than to inquire, whether the different Species ſpring from *Seminal* Principles really and unalterably differing, or from the ſame Matter variouſly modify'd by ſeveral and peculiar Organs. All that I ſhall offer in this Caſe is, that I think that their various degrees of *Vegetation*, depend upon the different degrees of Expanſion or Rarefaction of the *Air* contain'd in their ſeveral Juices, which will be greater or leſs, as External Circumſtances, and the Texture of the Veſſels of the ſeveral Plants themſelves concur to affect or admit it. Thus we ſee the ſame Species of Plants promoted or retarded in their growth, even in the ſame Soil, by the encreaſe or decreaſe of Heat, whether *Artificial* or *Natural*.

In theſe *Fermentations* of Liquors, which are partly Natural, partly Artificial, thoſe are obſerv'd to be forwardeſt, which are moſt impregnagted with *Air*, as we find in *Muſt*, *New Malt* Liquors, *&c.*

Bubbling of Liquors in Vacuo *whence.*

It has been found by Tryals in Mr. *Boyle*'s Engine, that thoſe Liquors, which are ſpecifically lighteſt abound moſt with *Air*, as appears by the different degrees of Bubbling and Intumeſcence upon the exſuction of the *Air*. This to me appears to proceed from no other Cauſe, than that by taking off the incumbent Weight, opportunity is given to the included *Air* to dilate and expand it ſelf. For tho' ſome Liquors will in that Engine bubble more than others, that ſwell more in Bulk, and are ſpecifically lighter, yet this ſeems to depend not only upon the *quantity* of the *Air* included, but upon the *Viſcoſity* of the Liquor it ſelf, whoſe ſurface will not ſo eaſily break without firſt riſing as it were in Bliſters.

Bubbles *moſt frequent and permanent in* Viſcous *Fluids.*

The common Experiment which Boys make of blowing *Bubbles* evinces this pretty plainly, for tho' in *Simple* Water it will not ſucceed, yet if a little *Soap* be incorporated with it, it will bear being blown up to a very great degree, ſo as to be let fly from a Pipe in pretty large Bladders, and ſo float for a conſiderable time in the open Air, and laſt more or leſs time, according as the Body of the Water, which makes the Shell of the Bubble, is more or leſs extended at its firſt parting from the Pipe. So in the Engine *Oyl* of *Olives* affords more, larger, and more laſting Bubbles than *Water*, which are owing to the lightneſs ariſing from the quantity of *Air*, and the tenacity of the Liquor. *Spirit* of *Wine* yields more numerous but leſs laſting Bubbles, and ſwells higher than *Water*. And *Oyl* of *Tartar per deliquium* affords very few, and no Intumeſcence. Theſe Experiments compar'd, ſhew, that the *Specifick Gravity* of Fluids depends upon the quantity of *Air* they include, and that the largeneſs and duration

Specifick Gravity *of* Fluids *whence.*

of the *Bubbles* is owing to the conſiſtence of the Fluid, thro' which the *Air* that compoſes them, makes it way. Let it be no Objection hereafter, when we come to apply this Doctrin to *Animal Fluids*, that all theſe Experiments we inſtance in here, are made upon the Product of *Vegetables.* For the ſame Tryals have been made upon *Animal* Liquors, which anſwer equally according to their *Specifick Gravity* and *Tenacity*, tho' it be not proper in this place to recite them.

Compounded *Liquors why readieſt to* Ferment.

It has been a general Obſervation, and is, in the main, true, tho' it does not always prove ſo, that the more mixt and compounded a Liquor is, the more ready it is to *Ferment.* Of this Obſervation the *Pyro-ſophiſts* have made great Advantages, pretending that all the Tumult and Buſtle that is obſervable in thoſe Liquors ariſes from the jarring and diſagreement of their Principles. This in my Mind makes rather againſt, than for their Philoſophy. For if their Principles, whether they make *Two*, *Three*, or *Five*, muſt needs be the *Elements* or *Hypoſtaticks* of all Bodies, it ſeems more natural that they ſhou'd readily cloſe and cement, than by ſuch a diſagreement break that Union, and diſcompoſe that Body, in which at laſt they muſt coaleſce. But as indeed they have never brought any ſatisfactory Proof that all Bo-

Bodies muſt be compounded of their Principles, ſo neither does it appear, that this Tumult in mixt Bodies ariſes from 'em, and therefore this Obſervation neither makes for or againſt 'em any farther, than that it ſhews them Arbitrary and Unaccurate in their Accounts. But *Heterogeneous* Liquors containing Parts diverſly figur'd, do not ſubſide ſo cloſe, as the more *Homogeneous* whoſe Parts from the Congruity of Figure ranging cloſer together, admit of leſs *Air* in their Interſtices, and conſequently are leſs obnoxious to a Tumultuous Rarefaction, which is, what is call'd *Fermentation.*

From the Internal *Diſpoſition of the Liquors not variety of* Elements

For as Mixtures may be made of a great number of Fluids, without any ſubſequent or laſting *Fermentation*, as of *Water*, *Wine*, *Sugar*, and *Juice* of *Lemons*, &c. ſo there are ſome other which after having become as to Senſe *Homogeneous* are, upon every ſlight occaſion, as a little Motion, or ſtanding warm, prone to Efferveſce very ſtrongly, as *Diacodium* will do, that ſeems as little or leſs compounded than many that will not do it ſo readily, nor to that degree, which plainly ſhews that it is not bare mixture, but an Internal Diſpoſition in ſome Fluids, greater than in others, that occaſions the different degrees of *Fermentation* under the ſame External Circumſtances.

The

Fermentation *of* Muſt *and other ſuch Liquors.*

The *expreſs'd Juice* of *Grapes* (which is call'd *Muſt*) is a Liquor that abounds with *Air*, as its *Specifick* Gravity ſhews, and therefore readily Ferments, and flings up to the Surface a ſort of Scum abounding with *Air*, which is call'd the *Flowers*, and conſiſts only of ſome of the more *viſcous* Parts mixt with ſome of that *Air*, which has made its eſcape thro' the thinner part of the Liquor, as appears by the Texture of it, which is only a heap of little Bladders fill'd with *Air*, which during the time of *Fermentation*, heaves and ſwells it into many Bliſters on the Surface, which laſt, (like the Bubbles, which Boys blow,) till that Viſcous Cortex is extended beyond the Coheſion of its Parts, and then break. The ſame happens to *Malt Liquors*, and others compounded of *Light* and *Viſcous* Bodies, the *Flowers* of all which conſiſt of Particles in that reſpect reſembling each other, and which, if cut thro' when dry, or near it, ſhew a ſpungy Texture abounding with little Cells of included *Air*. This *Yeaſt*, or *Flowers* of *Wine* or *Beer*, if put to Liquors that Ferment, but ſluggiſhly, will, as common Experience ſhews, make them Work very briskly.

Flowers *of* Wine *or* Yeaſt *promote* Fermentation, *why*

Not by Acid *and* Alkali.

The *Chymiſts* may perhaps pretend that it is the *Acid in Fluore*, with which theſe Flowers abound, that occaſions this *Fermentation*. But then there will be two Difficulficulties for them to anſwer. Firſt, where is the *Alkali*, upon which thoſe Acids ſhou'd opperate as ſuch? For none of theſe Liquors afford any, but from the *Incineration* of their *Lees* or *Tartar*, to produce which, or at leaſt to diſengage 'em from the Bodies, to which, before they were ſtrictly united, violence of Fire is requir'd. And that, if before really Exiſtent, was ſo implicated in other Bodies, as not to contribute any thing to the Operation they wou'd lay at its Door. And next, why thoſe *Flowers* of *Wine* or *Beer*, which after keeping, will grow very Sower, but will ſubſide, and let out a great deal of the Air they before contain'd, ſhou'd not Operate more briskly in this State than in the former, which if their Activity lay in the *Acid*, they muſt neceſſarily do? But Experience demonſtrates juſt the contrary, and ſhews that they may be kept till they are very Sower, and abſolutely unfit for forcing *Fermentation*.

Nor by their Volatile Vinous Spirit.

They that attribute the *Fermentations* of *Wine*, and other Liquors of that ſort to the Activity of the *Volatile Vinous Spirit*, and wou'd have that put the reſt in Motion, have at leaſt more ſhew of Reaſon on their ſide. For it is evident from Fact, that this *Yeaſt*, or *Flower* of *Wine* or *Beer*, affords in Proportion more *inflammable Spirit*, than the Liquor it ſelf after this Purgation. But then why ſhou'd not this Spirit, when extracted and defæcated by *Diſtillation*, act more vigorouſly, and ferment the Liquor more violently? On the contrary it will not in the leaſt move it.

Leven *why* Salted.

Among all the Experiments of *Artificial Fermentation*, there is not one that countenances the Notion of its proceeding from an *Acid*, except the *Salting* of *Leven* only: Which thoſe that wou'd derive all ſorts of *Fermentations* from *Acid*, and *Alkali*, pretend to be done in order to impart an *Acid*, and ſo exalt the *Ferment*, whereas they miſtake the meaning of thoſe that do it, which is only to preſerve it from growing Muſty and Stinking.

Whites *of* Eggs *beaten up to a* Ferment.

All the reſt ſhew plainly that their Action depends neither upon *Acid* or *Spirit*; nor in ſome can the moſt biggotted *Chymiſt* diſcover any of theſe. When ſome *Wines* (whoſe Colour is not inconvenient for ſuch a Method) Ferment ſluggiſhly; or want to be Re-fermented, the Skilful *Wine-Coopers* uſe *Whites* of *Eggs* whip'd up with a Whisk, ſo as to be very Light and Spumeſcent, which they ſtir into their Wines, and ſo ſet them again upon the *Fret*.

Without Acid *or* Vinous Spirit.

It can't be pretended that there is this Caſe either *Acid* or *Vinous* Spirit, or indeed any thing natural in the *White* of *Eggs*, except their *Viſcoſity* that contributes to their Activity. By means of that indeed it inviſcates, and engages the *Air* upon Conquaſſation, and thereby becomes capable of being equally mixt thro' the Body of the Liquor, and conſequently of raiſing ſuch a *Fermentation* as the Artiſt wants before it can Extricate it ſelf. For the *Air* being in this State compreſs'd, does by its *Elaſticity* naturally tend to recover its former degree of Expanſion, and not being able to do it all at once by means of Exploſion, occaſions a continu'd Series of Succuſſions *Quaquaverſum* in the Liquor, by which means ſeveral Concurrences and Combinations of the ſeveral Particles that float in it are occaſion'd, whence follows that Subſidence of the heavier, which is call'd *Precipitation*, as the Motion it ſelf is *Fermentation*

Fermentation *or* Fretting *of* Wines *by driving with* Bellows.

But if theſe, and all other Methods of *Fermentation* hitherto mention'd, might be ſuſpected of ſome ſecret latent Quality in the Ingredients us'd to procure it, there remains yet one in uſe among the skilful Brewers of *Wine*, and other Liquors, which is beyond all poſſibility of Exception, exempt from ſuch a Suſpicion. This is the way of doing it by BELLOWS only, in which they uſe a large pair of Bellows with a Stop-Cock upon the Snout. The end of which is thruſt thro' a Perforation made on purpoſe in the end of the Veſſel, from which the Liquor is to be driven thro' the Cock, at the other end into another Cask, which in Caſe of Prickt Wines is generally furniſh'd with a rich Spiritous Lee, with which the Wine by means of this impregnation, with *Air* is made to ferment, incorporate and repurge it ſelf again, and by this means decaying Wines are frequently reſtor'd, and made ſound, and ſometimes better than at firſt.

In this Caſe neither *Acid*, nor *Alkali*, nor *Spirit*, nor any other imaginary Agent, except *Air*, can have any thing to do; becauſe nothing elſe is mixt but Wine, and Lees of Wine, which ſimply put together will not ſucced ſo, let them agitate 'em how they pleaſe, unleſs ſomething be added to 'em, which is incorporated with more *Air* than the Parts of the Wine it ſelf.

Precipitation, *or* finiſhing *of Wines by* Arſenick, *&c.*

It is true, that *Vitriol*, *Arſenick*, and ſome other Bodies not ſo impregnated with *Air*, will in the high colour'd Wines help to ſtrike the Tincture deeper: But they are ſo far from forwarding the *Fermentation*, that they check it, and haſten the *Precipitation* of thoſe heavy Parts, which by an Union with them are carry'd down along with them.

An Inſtance of its danger.

It may not be improper here, tho' not directly to our preſent Purpoſe, to take notice that Wines thus fin'd down (as the Vintners call it) may Purge themſelves entirely from theſe dangerous Drugs by their abſolute Subſidence. Yet if the Wines remain never ſo little upon the *Fret*, it wou'd be very hazardous to drink of 'em in that State. Of this I happen'd to ſee an Inſtance in a Company of almoſt a dozen Men and Women: Of whom, he that drank moſt, did not drink above a Pint and an half to his ſhare, and ſome of the Women ſcarce half a Pint; yet every one of 'em were taken with *Violent Vomitings*, which were follow'd afterwards with large *Eruptions* or *Blotches*, with other Symptoms of a high degree of *Arſenical Poiſon.* However, not having drank much, with Care they all did well; but ſooner or later, according to the Proportion of their Drinking.

Cauſes of other Fermentations *eaſily deducible from the Premiſſes.*

The Deſign of this Chapter does not oblige me to go thro' the *Theory* of *fermented* Liquors, tho' there is ſcarce any of 'em, which may not be accounted for as demonſtratively as *Phyſical* Matters will bear by one or other of the ways already laid down: Eſpecially thoſe which tend to the Perfection, or Exaltation of the Liquor, that is, to render it more *Spirituous*, or manifeſtly *Vinous*, which is the only *Fermentation* which ſome will allow to be a true one.

I ſhall not in this Place make any particular Application to *Animal* Fermentations, becauſe that muſt be done in its proper Place, when I come to ſpeak of the Properties and Accidents of the ſeveral reſpective *Animal* Fluids, in order to which only I have made this Digreſſion about *Fermentation* in general, to prevent a confuſion of Idea's, or unneceſſary Repetitions.

CHAP. XIV.

Of DIGESTION *and* CHYLIFICATION, *and the* Apparatus *thereunto conducing.*

Organs *of* Digeſtion *very various.*

THE *Almighty Author* of which (to avoid Circumlocution and unneceſſary multiplication of Words) I often call *Nature*, having in his inſcrutable Wiſdom thought fit to create a great variety of *Animals*, and to appoint 'em different ways of ſubſiſting, has alſo given them very different *Organs* to prepare that *Aliment*, by which they are to be *Nouriſh'd.*

Teeth *why differently ſhap'd and diſpos'd in Animals of different Feeding.*

Of theſe ſome, being to break, and divide the *Maſs* upon which they are to feed, are furniſh'd with TEETH of different kinds, according to their ſeveral Exigencies: Thoſe, which feed upon Fleſh have *Teeth* in every part of *both* Jaws, ſome of which are to divide the Maſs into Morſels: Others to comminute, and grind it after it is ſo divided, which from their different Offices are ſome call'd *Inciſores*, or *Cutters*, others *Molares* or *Grinders*. Some Animals which are *Graminivorous* have the *Inciſores* in the *Lower Jaw* only, becauſe the Matter upon which they feed, is eaſily broken into ſuch Parcels, as they can readily ſwallow.

Fig. II.

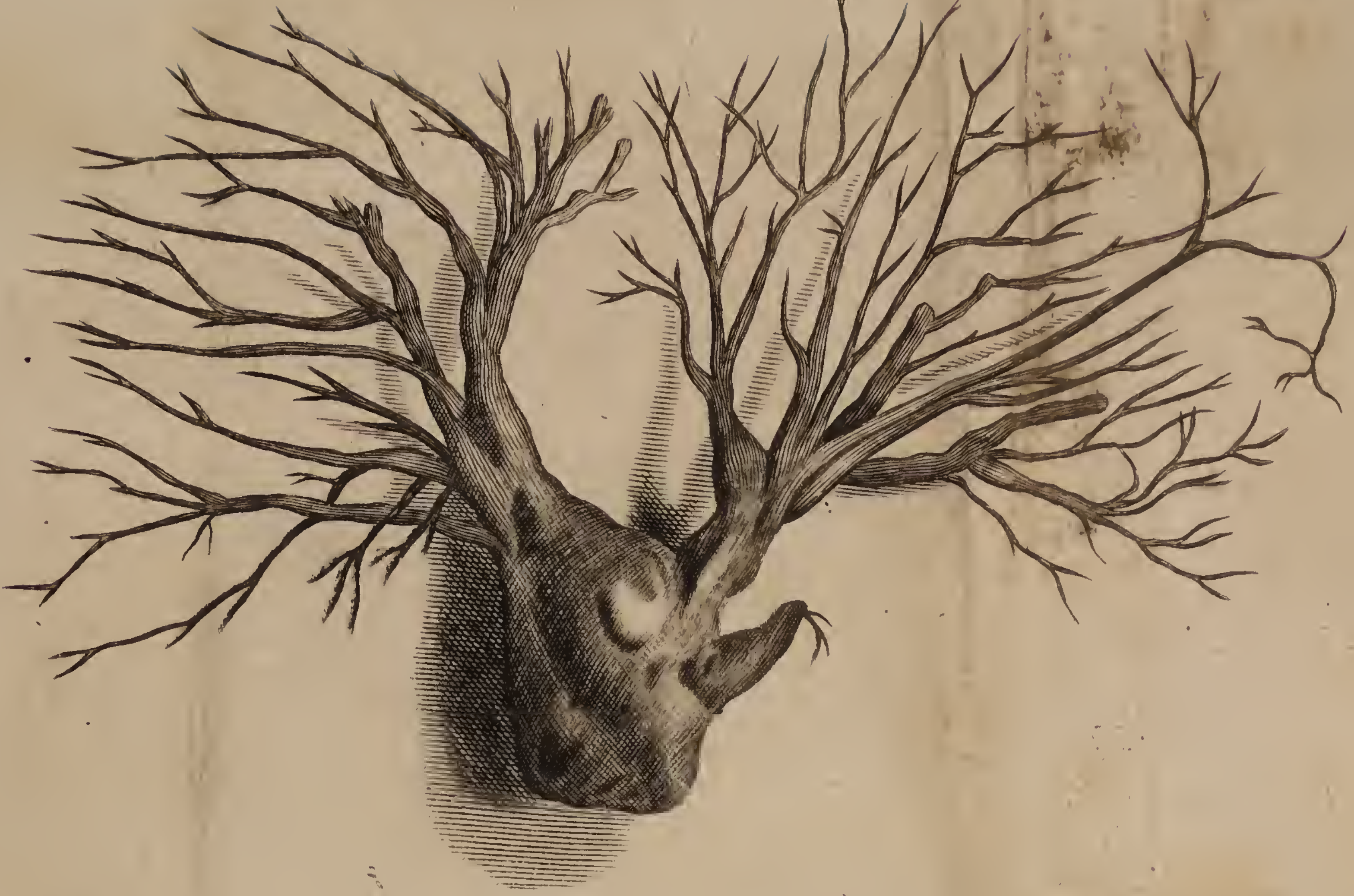
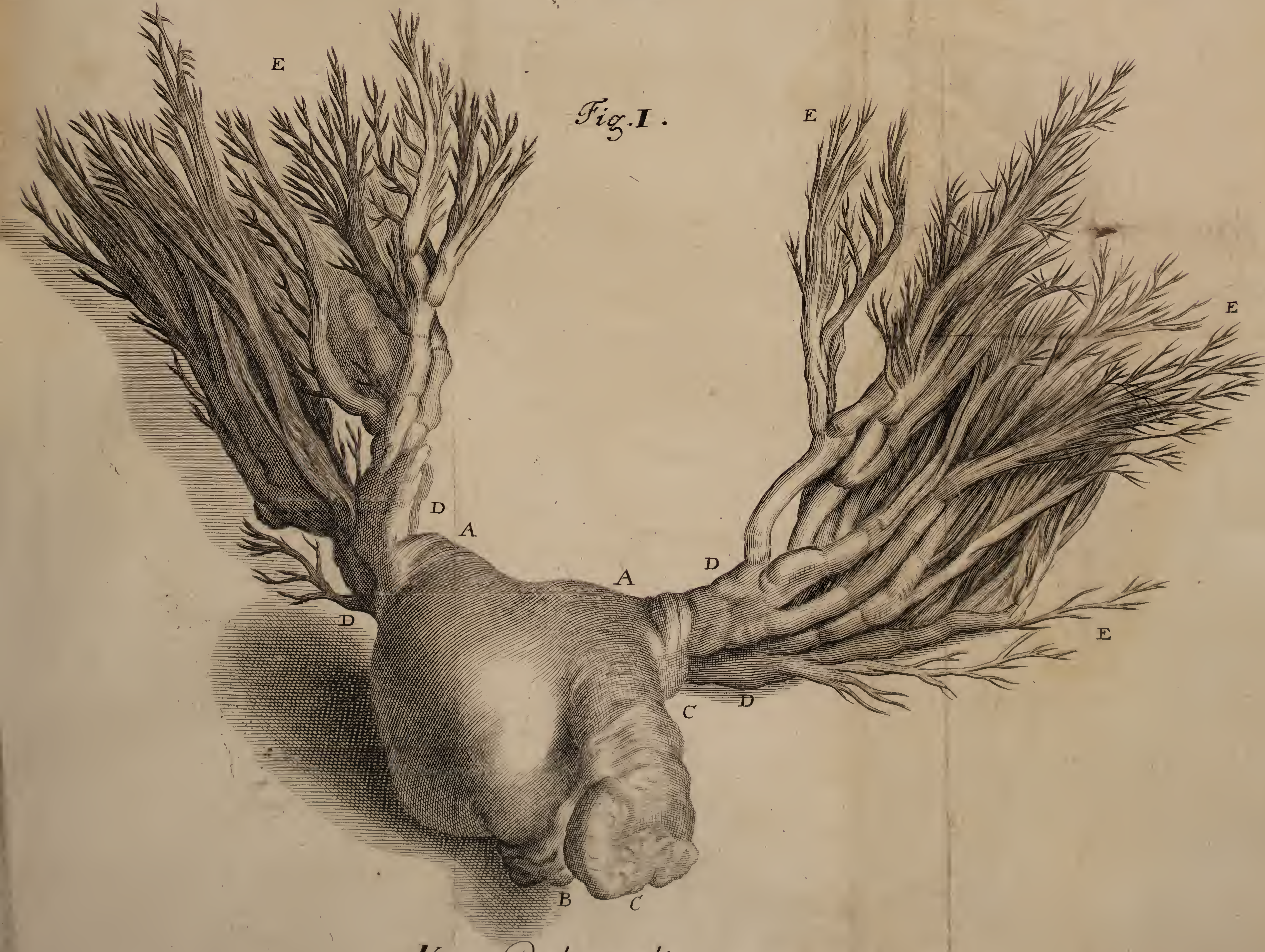


Fig. I.



Vena Pulmonalis

Grani-vorous *Animals have no* Teeth.

But an Ingluvies, *or* Crop.

Of the firſt ſort are *Men*, *Lyons*, *Bears*, *Wolves*, &c. of the latter are all the *Ruminant* kind, ſuch as have *Horns* and *Split Hoofs*, as *Oxen*, *Deer*, *Sheep*, &c. Others, which are generally ſuch as live upon *Grain*, or other ſorts of *Food*, that do not want to be broken before they are ſwallow'd, have no *Teeth*; but inſtead of 'em have an *Ingluvies* or *Crop* wherein the *Food*, which is generally hard and dry, is macerated and ſoftned before it is tranſmitted to the *Stomach*, which is *Muſculous*, and ſtronger than in other *Animals*, and ſerves inſtead of *Teeth* to break and grind the Aliment ſo macerated, in order to *Digeſtion.*

Peculiar to Granivorous Fowl

Gizzard *peculiar to* Granivorous Fowl

Of this ſort are moſt kinds of *Fowl*, eſpecially the GRANI-VOROUS: Tho' ſome others which are *Birds* of *Prey*, and live upon *Fleſh*, have no *Teeth*, yet they have ſomething analogous to the *Inciſors*, which is generally a *ſharp*, *crooked Beak*, that ſerves to cut, and divide that, which they feed upon. Theſe have no *Gizzards*, or *Muſculous Stomachs*: And tho' there are ſome which have ſomething like *Teeth* in their *Beaks*: Yet thoſe Teeth do not ſerve them either to divide or grind their Food, but to take the ſurer hold of their Prey only, and are peculiar to the *Fiſhing Fowls*, whoſe Prey wou'd otherwiſe be more apt to eſcape them, and ſome of the *Water Fowls*, that eat Herbs, which, if their *Beaks* were not indented, wou'd ſlip from 'em. Theſe as well as ſome ſorts of *Reptiles*, as the *Viper* kind, have *Teeth*, yet ſwallow their Prey whole.

Maſtication *of what uſe.*

I have mention'd theſe ſeveral kinds of *Dentation* in order only to examin the true ſervice of *Maſtication*, which ſeems to be in a manner peculiar to Men. For, tho' ſome other *Animals* uſe it, it ſeems to be only when their Food is only too hard, or too dry to be ſwallow'd unchew'd, as *Lyons*, *Dogs*, *Bears*, &c. when neceſſity forces them to eat *Bones* : Or *Horſes*, *Beans*, *Peaſe*, *Oats*, or other hard dry things. In theſe Caſes *Maſtication* ſeems to be purely preparatory to Digeſtion, and to be neceſſary to reduce the Aliment to ſuch a State as may fit it for the *Operation* of the *Stomach*. But whether that contributes any more than bare *Comminution* remains yet a Queſtion.

In Men communicates no Ferment.

Men, who *Maſticate* more upon leſs neceſſity than other *Animals*, are generally thought by *Authors* in that *Action* to impart ſomething to the *Maſs* beſides the *Comminution*, which they think conduces in an extraordinary manner, by way of *Ferment* or *Menſtruum*, to the Solution of what they Eat. But as this *Maſtication* is not conſtant nor equal in all Men, who ſeem to digeſt with equal Facility ; it is ſtill a reaſonable Doubt, whether ſome Uſes, which they have aſſign'd to *Maſtication* be true ones or not, and whether *Luxury*, and the *Pleaſure* of *Eating*, has not taught Men to Chew, more than other Animals, in order to have the fuller reliſh of their Food.

Prov'd by Inſtances.

It is certain that many *Creatures* as well provided for *Maſtication* as *Men*, and whoſe *Salival Glands* diſcharge as much as the *Humane* into their Mouths, do not give themſelves the trouble of ſo much *Maſtication*, and yet with the ſame *Apparatus* of *Organs* digeſt as quick, if not quicker, than Men do. And if *Old People*, who have loſt all their *Teeth*, have ſometimes worſe *Digeſtions* than thoſe who have not, other Cauſes may reaſonably be aſſign'd for that Infirmity of *Digeſtion*, than the want of *Teeth*. For it is obſervable, that *Younger Perſons*, who ſometimes from other Accidents loſe their Teeth, have not their *Digeſtive Faculty* weaken'd in proportion; not to mention that many *Animals*, which have either no *Teeth*, or don't uſe thoſe they have to Chew with, ſeem to have as vigorous a *Concoction* as thoſe that do. However I ſhall not deny, but that the *Comminution* of the *Aliment* between the Teeth, ſerves to promote, and haſten the *Solution* in the *Stomach*, which it may do by bare breaking the Coheſion, without ſuppoſing any neceſſity of a *Menſtruum* to do it afterwards.

Small Birds, *eſpecially* Parrots, *have ſomething equivalent to* Maſtication.

Many *Species* of BIRDS, eſpecially the *little Ones*, that feed upon the ſmaller ſorts of Seed, and have no *Teeth*, nor any thing that bears Analogy to them (except the ſharp edges of their little *Beaks* may be thought to do ſo) make however an uſe of theſe *Beaks*, which in ſome meaſure anſwers the end of *Maſtication.* For by theſe they crack the Seeds, and with the help of their Tongues ſeparate the ſoft Pulp from the dry Husk which they let fall: And particularly all of the *Parrot*-kind, which will feed upon the Kernels of Nuts, and other things, which are too large to be ſwallow'd whole, have a ſort of Action, which looks very much like *Chewing*, by which they nibble upon what they Eat, till they reduce it to very ſmall Parts, tho' it ſeems not ſo much in order to mix it with any *Ferment*, as to reduce it to ſuch a State, as may make it paſs the eaſier; and perhaps if they have any *Saliva*, it is no more than ſerves to lubricate, and facilitate the ſlipping of their Food down to the Stomach, which wou'd not be ſo eaſily effected if it were dry, as moſt of the things they live upon are.

Ingluvies *or* Crop, *anſwers the end of* Teeth *in* Granivorous Fowl.

Thoſe that generally feed upon *Grain*, as all the *Gallinaceous*, *Turky*, *Pheaſant*, and *Partridge* kind do, are obſerv'd to ſwallow every thing haſtily, without any ſtop of it in their Mouths, or any endeavour to break it there. But then indeed they have an *Ingluvies* or *Crop*, where it remains ſome time for *Maceration*, before it be tranſmitted to the *Stomach*, which thoſe that contend for a *Ferment*, may ſay is given them inſtead of *Maſtication* to impregnate the Aliment with that *Ferments*, which however is *gratis dictum.* For tho' the *Crop* of ſuch *Fowls* be furniſht with *Glands*, and the *Grain*, which they Eat, be actually ſoftned by the ſoaking which it receives there: Yet no real Solution or Separation of Parts is there made, but in the *Gizzard*, the ſtrength of whoſe *Muſcles*, and *Internal Membrane*, which is hard and dry, as well as the little *Stones*, and *Grains* of *Sand*, which theſe little *Fowl* ſwallow, ſhew theſe Parts to be contriv'd for *Attrition* and not for *Fermentation*, which the Narrowneſs and Strength of thoſe Parts will not give room for.

Lower Extremity of the Oeſophagus Glandulous *in* Fowls, *that have a* Gizzard.

It is true that moſt, if not all *Fowls* of this kind, have at the lower end of their *Oeſophagus* a conſiderable quantity of *Glands*, which afford a Liquor more viſible than even thoſe of the *Craw*, and which many *Anatomiſts* ſuppoſe to ſeparate a *Fermentative Juice.* But for that we ſhall aſſign another Uſe, (which it cannot be deny'd to be proper for) when we come to ſpeak of the *Converſion* of the *diſſolv'd Aliment* into *Chyle.*

Teeth *in many* Animals *not uſed for* Maſtication *tho' very ſharp.*

There are divers kinds of *Animals*, that not only have *Teeth*, but have them likewiſe ſharper, and more numerous than *Men*, or indeed any ſort of *Quadrupeds*, as divers kinds of *Fiſhes*, and all the *Serpent* kind, yet none of theſe uſe them for *Maſtication*, as appears from their Figure and Poſition, which renders them abſolutely unfit for it. For in *Fiſh*, many of which have three, four, or more rows of *Teeth* in each *Jaw*, they are generally extreme ſharp, and not planted oppoſite to each other, but ſo as to make, when the *Jaws* are clos'd, a kind of *Indentation* like that of two Saws, ſo wrought as to receive each other mutually, which is not a Poſition proper for *Grinding*, but very convenient for *catching* or laying hold of any thing. In the *Serpent* kind there are likewiſe divers *rows* of *Teeth* extremely ſharp, but all incurvated, and pointing towards the Throat, which is a ſituation very proper for entangling, and helping to ſwallow their Prey, which is uſually ſmall living Creatures, which they devour whole, but altogether unfit for dividing, comminuting or bruiſing. Some ſorts of *Fiſh*, which Prey upon the ſmall *Shell-fiſh*, ſuch as *Cockles*, *Muſcles*, and *Sea-Snails*, have indeed a ſort of *flat*, *broad Teeth*, which reſemble in ſome meaſure, in Uſe, as well as Figure, the *Grinders of Land Animals*; that is, they ſerve to break the Shells of

Indented in Fiſhes.

Recurv'd in the Serpent kind

Wherefore. Grinders *in ſome ſorts of* Fiſh.

of thoſe little Fiſh before-mention'd. Theſe are variouſly diſpos'd in the different *Animals*, ſome in the *Throat*, or upper part of the *Oeſophagus*, as in the *Orbis Marinus*, others even in the *Stomach* it ſelf, as in *Lobſters* and *Crabs*, which have three at the bottom with peculiar *Muſcles* for their Motion and Compreſſion.

Variety of Stomachs *reducible to three General* Heads *or* Kinds.

As *Providence* has allotted for the Suſtenance of the ſeveral Kinds of *Animals* a great variety of *Food:* So it has given them likewiſe a proportionable diverſity of Organs for the Preparation of it, beſides thoſe which ſerve for the firſt *Diviſion* and *Maſtication* already ſpoken of. The various ſorts of *Animals* have, according to the different occaſions of their kind of Aliment, a great variety of *Stomachs*, both in point of Number and Structure, which may however in the main, be reduc'd to three Principal or General Heads, of which in order to Illuſtrate our Notion of *Concoction*, we ſhall ſpeak more particularly. For tho' the ſeveral *Species* be almoſt indefinite, yet theſe being moſt conſiderable and beſt known to us, may ſuffice to ſhew the *Mechanical Apparatus* of *Nature*, for this Operation.

Of Carnivorous Graminivorous, *and* Granivorous.

The three I mean are the *Carnivorous*, the *Graminivorous* and *Granivorous*. The different *Mechaniſm* of whoſe ſeveral *Stomachs* ſeems under one Head or other to in-

include all the conditions neceſſary for the *Solution* of any thing conducing to *Animal Nutrition:* And of each Species of which there are ſome Animals in each habitable Element, unleſs we will deny any *Fiſhes* to be ſtrictly *Granivorous*, the Water not Spontaneouſly affording them any ſuch ſort of *Food*.

Account of Appetite *why Poſtpon'd.*

According to the uſual Method, *Hunger* ſhou'd firſt be accounted for, becauſe it is that which provokes us to Eat, and therefore the accidental Cauſe of all that follows in the Courſe of *Digeſtion.* But that being agreed by all *Authors* (however differing among themſelves otherwiſe in Opinion,) to depend upon the ſame *Active*, or *Efficient Cauſe*, with *Digeſtion* in it ſelf: It will ſave an unneceſſary multiplication of Words to Poſtpone the Account of it to that of *Concoction.*

Diſagreement of Authors about the immediate Inſtrument *of* Concoction.

Authors are very little agreed about the immediate Inſtrument by which the Aliment is diſſolv'd in the *Stomach.* Some will have it to be done by mere *attrition* or grinding by the Stomach it ſelf. Others impute it to a forcible *Diſſolution* of *Heat.* But the Opinion, which is moſt eſpous'd, is, that it is perform'd by means of a *Ferment* or *Menſtruum*, yet of what Nature, or to what *Claſs* it belongs, they are as little agreed among themſelves, as with thoſe who wou'd have it perform'd ſome other way.

Attrition *or Grinding*.

Thoſe that wou'd have it done by *Attrition*, impute it to the Rubbing of the *Stomach*, upon the Aliment by its *Periſtaltick Motion*, and fortify themſelves by the Obſervation, that *Fowls* and *Birds* that eat *Grain* and *Seeds*, have not only a ſtrong *Muſculous Stomach*, lin'd inwardly with a *thick*, *tough Membrane*, fit for *grinding*, but do likewiſe aſſiſt that Operation of the *Stomach*, by ſwallowing *Grains of Sand*, and *little Stones*, which are always found mixt with their *Meat* in the *Gizards* of thoſe *Fowls*, when they have eaten hard *Meat*, unleſs it be in *Domeſtick Fowls*, which have been coop'd up, and reſtrain'd from coming at 'em.

Not the Digeſtion *of Granivorous A*nimals.

If indeed Men did feed, as thoſe Fowls do, upon Grain or hard Meat, without *Maſtication*, and were furniſh'd with a *Stomach* ſo tight, firm, and ſtrong, and ſo lin'd, this wou'd not be an improbable *Hypotheſis*; but as our Food and manner of Eating are very different, ſo is the Mechaniſm of *Nature*. And as the *Texture* of the main *Organ* of *Concoction* the *Stomach* is ſoft, ſmooth, and yielding: (Qualities altogether oppoſite to thoſe that are requir'd to grinding) ſo Providence has given us an Appetite to things *reſoluble* another way. But if *Grinding* or *Attrition* were the *Human* way of *Digeſtion*, the *Mouth* ſurely, and not the *Stomach*, wou'd be the proper

Place where it ſhou'd be perform'd; for that is furniſh'd with *Teeth*, proper Inſtruments for that purpoſe. But whatſoever *Maſtication* may contribute towards *Digeſtion*, that it is not the only, nor indeed the main Inſtrument of it, we have already ſufficiently prov'd by the Inſtances we have given of the many Animals, the Subſtance of whoſe Food is the ſame with ours, which *Maſticate* very little, and moſt of 'em not at all.

Wherefore if the *Stomach* were capable of grinding the Aliment, as ſome ſuppoſe, it muſt however in a little time neceſſarily be worn as all other Bodies, which grind by degrees, are, how hard ſoever, eſpecially ſince many Things, which we uſe as *Food*, are harder and tougher even than the *Stomach* it ſelf.

Maceration *previous to* Attrition *even in the* Granivorous.

But they are miſtaken who think that even in *Granivorous* Fowls, the *Grain* which they eat, is ground in the *Gizzard* when hard. For that *Grain* which is found in the *Gizards* of thoſe Creatures, is, tho' unbroken, always Macerated, Swell'd and Soft: So that the *Gizzard* has not much more to do, than to break the *Husk* or *Cortex* of it, to reduce it to a *Pulp*. And for this very end it is, that all this ſort of Animals are furniſh'd with an *Ingluvies* or *Crop*, where the Aliment always makes a conſiderable ſtay, and in which it is often found Soft, tho' always unbroken, if it be *Grain*. Whether this *Maceration* proceeds from any Liquor ſeparated by the *Glands* of the *Craw*, or from the *Water* which thoſe *Fowls* drink, may be a reaſonable Queſtion. But as thoſe *Glands* do not ſeem ſufficient of themſelves to furniſh Liquor enough for that purpoſe without their Drink: So on the other hand it is not unreaſonable to believe, that the Liquor which they afford may contribute towards making their Drink, with which it mixes, more Active and Piercing, and ſo ſerve to ſoak it better and quicker than ſimple Water wou'd do.

Nor Elixation, *or Diſſolution by meer force of* Heat.

Thoſe that wou'd have the Aliment to be diſſolv'd in the *Stomach*, by the meer Virtue of *Heat* only, like a kind of *Elixation* or *Stewing*, will find a great deal of difficulty to prove their *Hypotheſis* reaſonable, unleſs they call in ſome other *Mechaniſm*, or Circumſtance, than I have hitherto had the Fortune to meet with among their Arguments. For none of them, that I know of, has given a ſatisfactory Reaſon, why Meat ſhou'd diſſolve faſter in the *Stomach*, than it does out of it by the ſame degree of *Heat*, or indeed a much greater. It wou'd be Impertinent at this time of Day, to pretend that *Culinary Fire* was not ſo *Natural* a *Diſſolver*, as the *Vital Animal Heat*; and yet no Care has been taken by thoſe,

Difficulties affecting this Hypotheſis.

thoſe, that hold this Opinion, to find out any other certain Property of this *Heat* to which they might rationably aſcribe that *Acceleration* of *Solution*, which is obſerv'd in the Stomach by many degrees to out-ſtrip that Diſſolution, which is made in the uſual Organs over a *common* Fire: And to pretend that the Heat was actually greater, and more intenſe, than that which is us'd in *Cooking* our Victuals, wou'd not only be a bare-fac'd Aſſertion againſt *Fact*, but againſt *Reaſon* likewiſe: For if it really were ſo, why ſhou'd not the *Stomach* it ſelf be *boil'd* and *diſſolv'd* by the *Heat*, as well as the *Meat* contain'd in it, which wou'd conſtantly happen in all other Operations by Fire or Heat, if the Matter contain'd were as hard to be diſſolv'd, and wou'd reſiſt as ſtrongly as the Veſſel containing? But not to perſue an Opinion any further, which in my Judgment at leaſt, has a bet-Foundation than thoſe who have caſually eſpous'd it, have hitherto been able to make out, we will proceed to examin the reigning *Hypotheſis*, which, taken in its largeſt extent, is become of late the Favourite, and only prevailing Opinion.

No Ferment *or* Menſtruum *peculiar to any of the* Organs *of* Digeſtion

Thoſe, who obſerving how unqualify'd the *Stomach* of *Carnivorous* Animals generally is for *Attrition* or Grinding, and therefore cou'd not believe the Aliment to be reduc'd to a Pulp that way, and yet were not ſatisfy'd that the Incaleſcence of the *Stomach* was ſufficient for that Operation, have call'd in the help of a *Menſtruum* or a *Diſſolvent* Liquor, by means of which, they have thought to account better for the ſpeedy *Reſolution* of the Contents of the *Stomach*, than by either of the other more *Simple* ways.

Various Menſtrua *the Product of* Imagination *only.*

But this being matter rather of Imagination, than Fact, eaſier to be ſuppos'd than prov'd, after firſt conceiving a neceſſity of ſuch a Liquor, they have employ'd themſelves more generally to invent the *Properties* and *Qualifications* of it, than to diſcover whether in reality it had a *Being* or *no*. So that this *Hypotheſis* ſtands altogether upon Conjecture, as well as to the *Exiſtence* of their *Menſtruum*: As to the *Nature*, *Properties*, and *Derivation* of it. From hence it comes to paſs that ſuch a variety of *Menſtruums* have been invented, every Man feigning it to be ſuch as he conceiv'd wou'd beſt anſwer the Difficulties and Doubts which he propos'd to himſelf, to reſolve by it. Hence ſome have fancy'd it to be an *Acid*, other *Alkalious*, a third ſort *Sulphureous*, a fourth *Acido-Sulphureous*, others *Alkalino-Sulphureous*, *Muriatick*, or of any other kind that their Fancy ſuggeſted to them as proper for the Work of *Diſſolution*, or exciting of *Appetite*.

Various Derivations of the Menſtrum.

As many Conjectures they have had about the Place of Nativity of this *Menſtruum:* Some fetch it from the *Spleen* by the *Vas Breve:* Others from the *Brain* by the *Nerves:* Some from the *Blood* by the *Arteries* in the Stomach, and others from the *Glands* of the *Mouth* and *Stomach*; in favour of all which curious, Notions and fine Speculations have been advanc'd, at the expence of Truth.

Acid *Ferment, how taken up.*

The *Chymiſts* and *Phyſicians Chymically* given, have generally been the Patrons of an *Acid Ferment*, upon a Notion at large, that *Acids* are the *Univerſal Diſſolvents*; which Opinion many others have given into upon the Account of ſome few *Phænomena*, which they cou'd, or thought they cou'd, reſolve by it; but eſpecially upon the Account of an *Aphoriſm* of *Hippocrates*, which they think Countenances it, tho' miſtakenly.

Hippocrates's *Meaning miſtaken.*

This Great Father of Phyſick has Aphor. 1. Sect. 6. ſaid, That * ACID BELCHINGS *ſupervening upon Inveterate* LIENTERIES, (that is, *upon Looſneſſes from a too great Slipperineſs of the* INTESTINES) *where they were not before, are a Sign of Mending.* And Lib. 7. Epidem. he ſays again the ſame thing, a little more at large, and affirms, that, *whether this Symptom come* ſpontaneouſly, *or be procur'd by* Art, *it* equally *cures* the *Diſtemper*, Ἴσως

* Ἐν τῇσι χρονίῃσι λειεντερίῃσιν ὀξυρεγμίη ἐπιγινομένη, μὴ γινομένη πρότερον, σημεῖον ἀγαθόν.

δ'

δ' ἐστὶ καὶ τεχνήσασθαι, καὶ γὰρ αἱ ταραχαὶ αἱ τοιαῦται ἀλλοιοῦσιν. Ἴσως δὲ καὶ ὀξυρεγμίαι λειεντερίην λύουσιν. From hence ſome would infer, that *Hippocrates* ſuppos'd *Acids* to contribute to good *Digeſtion*, becauſe, thoſe Signs of *Acidity* in the *Stomach*, whether they come *ſpontaneouſly*, or were *artificially* ſuperinduced, generally ſignifies, according to him, a *Solution* of that Diſeaſe which was attended with *Crude Dejections.*

And his Authority brought to Countenance a Falſe Notion.

But, in my mind, they ſtrain his meaning very much, who will, from either of theſe Paſſages, make the *Divine Old Man* hold, that the *Acidity* of the *Stomach* was neceſſary *ad Eupepſiam* in the *Natural* State. Whereas in truth all that he ſays in this caſe, concludes no more, than that theſe *Acid Belchings* ſignify'd, that the State of the Sick Perſon was alter'd for the better, when the *Aſſumpta* remain'd ſo long as to turn ſowr upon the *Stomach:* Or at moſt, that *Acids* given inwardly, and ſtaying ſo long as to ſend their Exhalations upwards, might contribute to the Cure; a Poſition which any Body may admit, without ſuppoſing an *Acid* to be the neceſſary Inſtrument of *Concoction* in a *Natural* State: But what Signs ſoever *Acid* Belchings may be, in a *Morbid* State of this kind; no ſort of *Ructus* or *Flatulence* whatſoever, is any Sign of a good Digeſtion in a *State* of *Health.*

The Author's Conſtruction of thoſe Paſſages in Hippocrates.

However, they that have been prepoſſeſs'd in Favour of an *Acid Menſtruum* in the *Stomach*, have very greedily laid hold of this occaſion, to draw ſo great an Authority over to their ſide.

Argument from Exciting Appetite *Fallacious.*

The other Argument, which they bring for their Opinion from the Obſervation, that *Acids* provoke *Appetite*, is as much ſtrain'd and fallacious as this. For though *Acids* may, by pricking and vellicating the *Stomach*, procure a Senſe of *Hunger*, and perhaps, by mixing with, cutting, and precipitating that *Viſcous Phlegm*, or Matter, with which the *Stomach* is ſometimes overloaded, even to the *Proſtration* of *Appetite*, may accidentally procure a better *Digeſtion*, as they ſcoure and cleanſe the *Stomach*, yet that is no Proof that any ſuch ſort of *Menſtruum* is neceſſary, and primarily employ'd by *Nature* in the Action of *Digeſtion*. For divers other things which are not manifeſtly *Acid*, and ſome that are even oppoſite to, and deſtructive of *Acids*, will ſometimes do the ſame thing, as is notoriouſly known of the *Bitters*, eſpecially to all *Practitioners* in *Phyſick*, and in ſome Caſes, when judiciouſly apply'd, of the *Volatile Animal Salts*, and *Lixivial Vegetable* ones.

Acids *improper Inſtruments of* Chylification.

But neither do *Acids* ſeem naturally fit to promote *Chylification*, or to produce a Liquor, which they are of themſelves ſo prone to Coagulate, as we daily ſee by thoſe *Coagulations*, which the ſlighteſt *Acids* produce in *Milk*, which is nothing elſe but *Chyle* a little defæcated. For tho' *Milk* upon ſtanding, will indeed turn Sowr without any other mixture: Yet whenver it does ſo, Experience ſhews that the Form of the *mixt* is immediately deſtroy'd by it, and ſufficiently demonſtrates thereby that ſuch a State of *Acidity* as theſe Men wou'd ſuppoſe, is utterly inconſiſtent with the Being of that Liquor. Neither do they ſhew us, that if they cou'd poſſibly conſiſt together, there is in a *Humane* Body any *Matrix*, that ſhou'd produce and furniſh this *Acid Menſtruum* either in the *Stomach*, or any other Part.

Acid *Remains of* Chyle *not ſufficient, if exiſtent.*

The *Sowr Remains of* CHYLE, which (after the Learned Dr. *Gliſſon*,) Dr. *Willis*, and ſo many others have taken up with (for want of a better Expedient, that might have ſome Shew of a real Exiſtence) to do the office of an *Acid Ferment*, or *Menſtruum* to cut and divide by its Sharp, Corroſive Parts, the new ingeſted Aliment in the *Stomach* in ſo ſhort a time, as *Digeſtion* is ordinarily made in, is by no means an Inſtrument ſufficient for the Purpoſes aſſign'd. For, beſides, that it is a Queſtion whether any part of the *Chylous* Maſs does ever remain behind *in ſtatu ſano* in the Folds of the *Stomach* after *Chylification* compleat, and exinanition into the *Inteſtines*, it is ſtill a farther Queſtion, whether thoſe Remains be naturally *Sowr* or not. *Autopſy* has never (that I know of) favour'd the Affirmative part of either of theſe Points; but has very often decided directly to the contrary, as I have frequently experienc'd in *Dogs*, which are as proper Subjects for ſuch Tryals, as we can even deſire. In theſe I have often expreſly ſought for theſe Remains of *Chyle*, but cou'd never ſee any ſigns of any ſuch thing, nor taſt any the leaſt Degree of *Acidity* upon the *inner Coat* of the *Stomach*, tho' I made my tryals upon 'em, when their Appetites appear'd to be as keen as they cou'd poſſibly well be, and conſequently this ſuppos'd *Vinegar* of the *Stomach* ſhou'd have been in its higheſt ſtate of Exaltation. Neither wou'd any of 'em turn *Milk*, tho' I ſometimes boil'd 'em in it, and at others kept it in them, as long as was reaſonable to avoid making a fallacious Experiment.

Plicæ *of the* Stomach *not made to detain any part of the* Chyle.

Thoſe that plead for theſe *Aceſcent Remains of Chyle* thought themſelves ſufficiently warranted by the *Plicæ* or Folds of the *inner Coat* of the *Stomach* to ſuppoſe a reſidue of ſome kind or other, and which they, ſuppoſing it to reſemble *Milk* in that Property too, expected ſhou'd turn Sower. Not to inſiſt here upon the Infirmity of Reaſonings drawn from *final* Cauſes, or from *Analogies* not ſufficiently conſider'd, both which are to be found in this *Hypotheſis* of the *Acid Remains* of *Chyle*: It is eaſie to ſhew that the *Rugæ* or *Plicæ* of the *inner* Membrane of the *Stomach* were not unneceſſarily fram'd only to detain this Matter, which they dream of, but upon Mechanical neceſſity. For the *outer Tunic* of the *Stomach* being made *Fibrous* and *Contractile*, or *Dilatable*, according as the *Stomach* is empty or full, the *inner* muſt neceſſarily obey its Motions, and either ſhrink up, or dilate with it, or otherwiſe lie wrinkled or folded up, when the *Exterior* was not dilated. But this Contractility is not to be found in any *Glandulous* or *Villous Membranes*, and conſequently that it might ſometimes be dilated to all the Dimenſions of the *Stomach* when full, and yet comply with all its Coarctation in its narroweſt State of contraction (which Membranes of this Nature have no Power to do) it muſt be made to ply and fold as this Membrane does.

Mechanical neceſſity of thoſe Plicæ.

Thoſe that love *final* Reaſons for ſuch things may be ſatisfy'd to know, that it was by no means convenient that the *inner Coat* of the *Stomach* ſhou'd be endow'd with a Power of contraction like the *outward*. For all ſuch *Contractile* Membranes are extremely *ſenſile*, which upon many Scores, it is not proper the inſide of the

Uſe of that Structure.

Stomach of Animals ſhou'd be; ſince by its inſenſibility it is guarded againſt innumerable Provocations, which otherwiſe cou'd not be avoided; and does here to the ſenſile Parts of the *Stomach*, what the *Cuticula* does to the *Cutis*.

Different Effects of Rennet, *and the ſuppos'd* Remains *of* Chyle *in the* Stomach.

Indeed many of thoſe, who have contended for an *Acid Ferment* in the *Stomach*, have been very ſenſible of the inſufficiency of any ſuch *Acid* as might be form'd out of the *Remains* of *Chyle*. And have look'd out for other means, notwithſtanding the famous Inſtance of the *Rennet-bag*; whoſe Liquor being Salted, and Pickled, bears no Analogy to what was found in the *Calve's Stomach* before Pickling: Nor indeed are the Effects of the *Rennet* ſo made any thing like to what they aſcribe to this *Menſtruum*; for that coagulates, and this diſſolves: This digeſts the *Milk*, which the *Calf* lives upon: And that deſtroys it, and renders it leſs fit for Nouriſhment than before.

Meats Pickled or Salted *made harder of* Digeſtion.

All the Tryals that have been made by *Artificial Digeſtions* to diſſolve *Fleſh*, have been made with *Acids* of another Claſs and Nature, than *ſowr Milk* or any of that low form of *Acids*, which they have found by Experience to preſerve, not deſtroy it, as *Vinegar* and thoſe *Salts* which abound with *Acids* do. Neither are thoſe Meats ſo preſerv'd, more obedient to the Faculties

ties of the *Stomach* for having been *Pickled*, or of better Nouriſhment, as they ſhou'd be, if they contain'd any thing congenial to the *Natural Ferment* of the *Stomach*: But on the contrary they become *harder* of *Digeſtion*, and of *leſs Nouriſhing* Juice.

Dr. Havers's *Experiment with* Oyls *of* Vitriol *and* Turpentine.

Dr. *Havers* finding theſe *Acids* inſufficient to diſſolve and reduce Fleſh to a Pulp, propoſes an Experiment with *Oil* of *Vitriol*, which he ſays will do it. But being well aware of that obvious Objection, that it is morally impoſſible for the *Stomach* (without the utmoſt danger) to bear ſo *highly corroſive* an *Acid*, he propoſes to qualifie it by an *Oleaginous* Mixture, ſomething like *Oil* of *Turpentine*. To illuſtrate this Notion, he puts *Raw Fleſh*, *Crums* of *Bread*, *Oil* of *Turpentine*, and *Oil* of *Vitriol* together; and after ſhaking them well, commits them for four hours together to *Digeſtion* in *Balneo Mariæ*; and then upon ſhaking his Glaſs again, he finds the Meat diſſolv'd, and all together making up a thickiſh *Pulp*: From whence he concludes that the *Menſtruum*, which diſſolves the Aliment in the *Stomach*, muſt be ſomething of the Nature of the Mixture of thoſe *two Oils*.

And Hypotheſis.

Deficient in many Particulars.

But (with all due regard to the Notions, and Experiments of ſo Ingenious a Man) he has been too haſty in drawing his Concluſions, and ſhould have regiſter'd the other *Phænomena* of his Experiment, before he rais'd ſo large an *Hypotheſis* upon ſo narrow a Bottom, as the ſeeming Agreement in one ſingle Accident, *viz.* the *Reduction* of the *Meat* to a *Pulp.* He ſhould have ſhewn that this Pulp, or the Liquor which it afforded, agreed perfectly in *Taſte*, *Colour*, *Smell*, *Conſiſtence*, and other Accidents with the *Chyme* or *Chyle*, that reſult from Animal Digeſtion. But, unleſs the Liquor which this Maſs afforded, was ſuch a *Sweet*, *Soft*, *White Inodorous* Juice, all the Demonſtration his Experiment amounts to, is, that the *Oils* of *Vitriol* and *Turpentine* mix'd, will reſolve and reduce *Fleſh* to a *Pulp*, but will *not* make *Chyle*; which ſhews his Experiment ſomething worſe than unconcluſive, that is, it is concluſive againſt the Uſe he would make of it.

Not help'd by his other two Experiments.

However the Doctor is ſo ſatisfy'd in the Sufficiency of his Experiment, that he proceeds to inquire how this *Fermentative Vitriolick Terebinthinate Mixture* is form'd in an *Human* Body, and imagines to find two divers ſorts of Liquors, one *Acid*, and the other *Sulphureous*, ſeparated from the *Salival Glands*, and mix'd in, or about the *Mouth*, which, *though apt to ferment upon their firſt Mixture*, *are yet*, perhaps, *apt to do ſo more conſiderably when they come to be digeſted by the Heat of the* STOMACH. And in this Opinion he fortifies himſelf with *two other* Experiments, which he made after the ſame manner upon *Meat*, with *Oil* of *Vitriol* mix'd ſeverally, one with a *Solution* of *Salt* of *Tartar*, the other with *Oil* of *Camphire*, which did not ſucceed ſo well as the Experiment with *Oil* of *Turpentine*: From whence he draws this particular Concluſion. * *And I do the rather think one of thoſe Juices which conſtitute the* Saliva, *to be of the Nature of* Oil *of* Turpentine, *than of a* fix'd Salt, *becauſe it will correct and temper even* Oil *of* Vitriol, *ſo as to render it more tolerable to the* Fibres *of the* Stomach. *Not that I ſuppoſe the* Acid part *of the* Saliva *to come near to the Acidity of* Oil *of* Vitriol. *For though when they are mix'd, they will make a* Liquor *that may not be injurious to the* Stomach: *Yet that* Acid Juice, *if it were ſo* corroſive *as* Oil *of* Vitriol, *would certainly be injurious and painful to the* Salivatory Ducts, *which convey it to the Mouth before it is mix'd with the* Oleaginous Liquor. *But I only ſay it is an* Acid, *and in ſome degree approaches to the* Nature *of that* Oil.

Diſcourſe concerning Concoction, *read before the* Royal Society *by* Dr. Havers, *May* 1699.

It is obvious for the *Reader* to diſcern, that this *Hypotheſis* ſtands purely upon the Foot of the Experiment before mention'd, which has been ſhewn to be inſufficient. But if it were not, nothing could make it certain, but the Actual Demonſtration of the real Exiſtence of ſuch Liquors ſincere, and apart in the Body, and their Conveyance together into the *Stomach*. For this

Precarious Foundation of this Hypotheſis.

purpoſe the *Doctor* aſſigns two *pair* of the *Salival Glands* to the Separation of the *Acid Liquor*, and the other two Pair for that of the *Oil* of *Turpentine*, as diſtinctly as if he had really found, and examin'd them ſufficiently apart, which is the more ſurpriſing, becauſe it is in reality no hard matter to do it, and that Experience does conſtantly ſhew, that theſe *Glands* do not afford *Liquors* ſo much as ſenſibly diſtinguiſhable, and that the Liquor which they do afford, does not in the leaſt reſemble either *Oil* of *Vitriol*, or *Oil* of *Turpentine*, or any kind of *Acid* or *Volatile Eſſential Oil* whatſoever. Nor indeed does any part of the Body afford any ſuch kind of *Subſtances* at any time, or by any *Tryal* or *Analyſis* whatſoever.

Acido-Sulphureous Menſtrua, *all obnoxious to the ſame Exceptions*

The Objections, which lie againſt this *Hypotheſis* and that before mention'd of the *ſowr Chyle*, reach all ſorts of *Acido-Sulphureous Menſtruums* in the *Stomach*. For, if they be *temperate* like the firſt, they will not be *corroſive* enough to procure a *Solution:* If they be not, but *exalted* Acids, they are lyable to the ſame Exceptions juſt now offer'd, and nothing reſembling either of them, in either State, is to be found among all the *Animal Fluids*.

Alkalious *or* Alkalino-Sulphureous, *a more plauſible Invention;*

Thoſe that hold the *Menſtruum* of the *Stomach* to be *Alkalious* or *Alkalino-Sulphureous*, are ſomewhat more countenanc'd in their Opinion, by the Subſtances which may be produced by the help of Fire from all ſorts of *Animal Fluids*, all which yield *Volatile Alkalious Salts*, *Spirits*, *Phlegm*, *Oil*, and *Caput Mortuum*, differing only in proportion according to the different Mixture of the Liquor it is drawn from, whether that be *Urine*, *Blood*, *Bile*, or any other. But though all theſe Subſtances may be drawn from the *Natural* Juices of the Body, and may be allow'd to have preexiſted in them; yet it muſt be confeſs'd that all of them are in ſome Meaſure alter'd by the Fire, though that Alteration may, perhaps, be no more, than would reſult from any other *Reſolution* of their Mixture. However, if any of them will, after this Separation, act ſo vigorouſly upon *Fleſh*, as to diſſolve it in ſuch a *Heat*, as that of the *Stomach* may be granted to be, that Activity is certainly owing to the *Exaltation* which it had from the *Fire*. For no where in the Body, in its Natural State, do we find any *Salts* or *Sulphurs* ſo *exalted*, as to be capable of making ſuch a *Diſſolution*.

Animal *Subſtances all yield* Volatile Alkalies.

But not unalter'd by the Fire.

Neither can I ſee (let this exalted *Salt* or *Sulphur* be convey'd by what ways or means ſoever, the *Patrons* of this Opinion will or can ſuppoſe) what hinders the *Menſtruum* that ſo readily diſſolves the *Aliment* from touching the *Stomach* it ſelf, which is oftentimes of the ſame, or ſlighter Texture, than even the Matter it ſelf, which it digeſts: And one might as well expect, that *Aqua fortis* put upon pieces of *Iron*, in an *Iron* Pot, ſhould diſſolve the pieces of the Metal, without touching the Veſſel, which is an Experiment, I doubt, no *Chymiſt* would be perſwaded to try.

This Objection holds equally good againſt all ſorts of Menſtrua *in the* Stomach.

This Objection, indeed, holds good againſt all kinds of *Menſtrua* in the *Stomach*, as *Digeſters*, whether we ſuppoſe an *Acid*, or *Alkalious*, *Saline*, or *Sulphureous*, or however mix'd: For ſtill the Matter to be wrought upon is the ſame, or of the ſame kind, with the Veſſel in which it is to work. They therefore that will have a *Menſtruum* to be the *Efficient Cauſe* of the *Diſſolution* of the *Aliments* in the *Stomach*, are oblig'd to find ſomething in the *Aliment* it ſelf, before it comes into the *Stomach* (which muſt be a Condition the *Stomach* it ſelf has not) that diſpoſes it to receive the Impreſſion of the *Menſtruum*.

Saliva *no proper* Menſtruum.

This ſome endeavour to find in the Impregnation of the *Aliment*, with *Saliva* by means of *Maſtication*. But, if the *Saliva* were a Juice ſo very Acrimonious, it would be impoſſible for it never to offend the *Stomach*, eſpecially conſidering the Quantities of it, that many ſwallow even upon an *empty Stomach*. However the ready *Digeſtion* that thoſe Animals have, which do not *Maſticate* at all, but ſwallow their *Prey whole*, of which I have ſpoken at large in the beginning of this Chapter, demonſtrates the Inſufficience of that Cauſe.

Menſtruum, *or* Principle *of* Digeſtion, *muſt be ſomething* Internal, *and intimately inherent in the* Aliment *it ſelf.*

Whatſoever therefore this *Ferment* or *Principle* of *Fermentation* is, that ſets the Wheels of *Diſſolution* ſo nimbly a going; it muſt be ſomething *Internal*, and *Inherent* in the *Aliment* it ſelf, which is an Opinion of ancient ſtanding, but has been rejected for that of a *Menſtruum*; becauſe an Inward Cauſe, or Condition ſufficient for this great Operation, was not ſo expreſly, and by Name aſſign'd, as that ſpeculative and curious Men might have wherewithal to ſatisfie their Inquiries, and judge for themſelves of the Truth of the *Hypotheſis*. However they that went thus far, though they did not clearly, and explicitly, diſcover all, did good Service to Truth, and had they, who rejected that Opinion, been as ſcrupulous about the Evidence of thoſe others, which they took up in its ſtead, it is probable it had not loſt ground, but that the *Latent Property*, upon which this grand *Phænomenon* depended, had long e'er now been brought to light.

Three things previouſly to be conſider'd.

In order, therefore, to diſcover what this great Secret is, which has been ſo long ſought after, with ſo much Induſtry, and ſo little Succeſs, it will be neceſſary to conſider three things.

Firſt, What is the *State* or *Condition* of the ALIMENT, as *Nature's*, or *our own*, Preparation offers it to us, before it enters the MOUTH.

2dly, What *Changes* it undergoes in the MOUTH, before it reaches the STOMACH. And,

3dly, What it *ſuffers* in the STOMACH, in order to a thorough *Diſſolution*.

Aliment *reducible to two General Heads. Of which* Two States. *In their* Firſt, *or* Natural State, *ſubject to unavoidable* Diſſolution. *Their* Second *a State of* Actual Decay. *Yet quickned by the* Changes *wrought upon them in the* Mouth, *&c.* *Theſe, attended, to ſhew the Reaſon of the Variety of* Organs *for* Animal Digeſtion

First then, All thoſe *Subſtances*, upon which any ſorts of *Animals* feed, may be reduced to one of theſe two General Heads, either of ANIMAL or VEGETABLE (for I know of no Creature that lives upon *Minerals*) which being Subſtances of their own Nature periſhable, or ſubject to decay, their *Diſſolution* may be haſtned or retarded by Accidents.

Secondly, All thoſe *Subſtances*, before they come into the MOUTH, or at leaſt as ſoon as they come into it, are depriv'd of their ANIMAL or VEGETATIVE *Life*, and conſequently in a State of *Natural* Decay, the *Principles* or Means of which they carry along with them, which are only put into or haſtned in their Action, by the *Changes* which they ſuffer in the *Mouth* or *Stomach*, &c.

From theſe things well attended to, we ſhall not only be able to obſerve the *Means* which *Nature* uſes in the *Diſſolution* of the *Food* in *Animal Stomachs*, but likewiſe of the great variety of Organs, which ſhe has made for that purpoſe; at leaſt, we may by Attention arrive at it for thoſe of whoſe *Anatomy* and way of *Living* we know the *Hiſtory*.

Organs *of* Digeſtion *why moſt* Simple *in* Carnivorous Animals.

Of all theſe kinds, which are reckon'd perfect, the *Apparatus* for *Digeſtion* is moſt Simple in the CARNIVOROUS, (moſt of which will live upon Fruits likewiſe) in which their *Organs* are ſuited to their Dyet, which is the eaſieſt of *Digeſtion*. For *Fleſh*, *Fruits* and *Sallad Herbs* being the moſt ſucculent of all the kinds of *Food*, which any *Animals* naturally eat, they *Ferment* of themſelves, and come to a *Digeſtive Solution* much more readily than *Grain* or *Seeds*, or any kind of *dry Vegetables*. The Reaſon of which has been already given in the Chapter of *Fermentation*.

What Dreſſing *of* Meat *contributes to* Digeſtion.

Men do however generally prepare thoſe things, which they Eat, eſpecially the *Fleſh*, by divers kinds of *Dreſſing*: Whether this Cuſtom was firſt introduc'd by Luxury or Neceſſity, is not a very Material Inquiry here: But, if by ſuch *Dreſſing*, the parts of the Meat be render'd more *looſe*, and leſs *coherent*, it becomes thereby of eaſier *Digeſtion* in the *Stomach*: If otherwiſe, as in *Pickles*, *long Salted*, and dry'd Meats, it becomes *harder* of *Digeſtion* for it, and generally of *worſe Nouriſhment*.

Early Fruits, *and*

Of all the things that Men eat, the *Horary* or *Summer Fruits* are of quickeſt *Solution*, if ſtript of their Rinds, becauſe the Body of 'em is more ſoft and ſucculent, than that of other things we eat.

Sallad Herbs, *why eaſier of* Digeſtion *than*

Next to theſe in point of quick *Solution* are the *Lacticinia* or the *Succulent Sallad Herbs*, which abounding with Heterogeneous Juices eaſily Ferment with Heat.

Fleſh: *Whence* Roaſting *and* Boyling, *&c. introduc'd.*

The laſt and longeſt of *Digeſtion*, of all the kinds of Foods that CARNIVOROUS *Animals* naturally ſeek, is *Fleſh*, which tho' its Parts be both ſucculent, and ſoft, yet are neither ſo Juicy, nor ſo ſoft and looſely coherent, as either of theſe before mention'd. And perhaps, as well out of Neceſſity as Luxury, Obſervation at firſt taught Men by *Roaſting*, and *Boyling*, and other kinds of *Dreſſing*, to looſen the *Compages*, and ſoften the Parts of what they were to eat. Yet many whole Countries, even to this Day, reject the whole *Art* of *Cookery*, and eat their Meat *Raw*: And for any thing we can ſee, as much to the Advantage of their Health and Vigour, and perhaps as much to their Luxury.

Grain, *why by Men either conſtantly* Ground *and* Sifted, *or* Softned *by* Steeping.

Men do likewiſe eat *Grain*, and ſometimes *Roots*: But theſe are always prepar'd when us'd as a conſtant ſort of Dyet as Bread is by Grinding, Fermenting, and Baking, whereby the Subſtance of the *Grain* is not only broken very ſmall, but the mixt *Maſs* made of it afterwards, is occaſioned to cohere very looſely, and to contain a great deal of *Air*, which contributes to its future Diſſolution in the *Stomach.* We do indeed uſe Grain divers other ways, beſides in *Bread*, *Pyes*, and *Puddings*, which have all ſomething very Analogous in their Preparation; but then we Macerate and Soften the Grain by previous Boyling or Steeping, and reduce it ſomething nearer a State of *Fluor*, than it is found in the *Craw* of *Fowls*, which does the ſame Office, but need not carry it ſo far as our Artificial Preparations do, becauſe the *Gizzards* of *Fowls* being much ſtronger, and more Muſculous, are conſequently better able to grind it, eſpecially by the aſſiſtance of thoſe *little Stones*, or *Grains* of *Sand*, which they conſtantly ſwallow.

Indian *Bread made of* Roots.

The INDIANS, many of 'em, uſe ROOTS inſtead of *Grain* to make their *Bread* of. But then even the rudeſt of them prepare it by ſome ſort of *Maceration*, and *Fermentation*, previous to their Eating of it, that may reduce it to ſuch a State as may give the *Stomach* leaſt trouble in the Diſſolution of it.

Marmouſets Squirrels, &c. *comminute their Food with their Fore-teeth.*

Thoſe *Animals*, which are obliged by Nature to live upon Food ſomewhat harder, than that of Men, yet have no *Ingluvies* to Prepare and Macerate it for the *Stomach*, (ſuch as MARMOUSETS, SQUIRRELS, *Rats*, *Field Rats*, and *Mice*, that eat hard *Wild Fruits*, *Nuts*, *Cheeſe*, *Roots*, &c.) are obſerv'd to nibble a long time with their *Inciſores* or Fore-teeth (which in thoſe Creatures are very long, ſtrong, and ſharp) till they have exceedingly comminuted the Matters they eat, which are generally too hard for *Maſtication* in theſe ſmall Animals, and therefore they anſwer that end by gnawing that exceeding ſmall with their fore Teeth, which they wou'd not have Strength enough to break with *Grinders*.

Early Fruits, *why generally thought to be of very bad* Digeſtion.

Some have deny'd the *Fructus Horarii* and *Lacticinia* to be of eaſie Digeſtion, becauſe they obſerve, that they frequently produce *Flatulencies*, *Gripings*, and other troubleſome Symptoms. But this Objection ſprings from want of conſidering *Digeſtion*, *Chylification* and *Nutrition*, as diſtinct Operations, which they confounding together, call that *hard* of *Digeſtion*, which does not yield much *Chyle*, or prove *good* Nouriſhment. It is true indeed of many of theſe ſorts of *Fruits* and *Herbs*, that they are apt to raiſe diſorders in the *Stomach* and *Inteſtines*. But this Fault proceeds not from a difficulty to be digeſted, but from too great a promptitude to it, and from the *Fermentative* Diſpoſition of the Juices, which they yield, which will not let them remain long enough in the *Stomach* and *Inteſtines* to be ſubacted or qualify'd by the mixture of other things there for good Chyle, and Nouriſhment. So that their *Crudity* or unalter'd Simplicity of appearance, when they come away, proceeds from an *over-haſty*, not too *ſluggiſh* Solution in the *Stomach*.

Quadrupeds, *that eat* Dry Meat, *Great* Maſticators.

This generally is the *State* and theſe the Conditions of *Human* Food, before it comes into the Mouth. That of *other Animals* generally undergoes no alteration, except it be that of *Domeſtick* Animals, which ſometimes eat *dry Meat* (ſo call'd in contradiſtinction to that which is *Green)* which is harder of *Digeſtion*, than the other, but theſe are generally very great *Maſticators*, whether they have but one ſimple Stomach as *Horſes*, or four as the *Ruminants* have.

Second *State of the* Aliment.

The *ſecond* State of the *Aliment*, which we propos'd to conſider, is that which is introduc'd in the *Mouth*, which depends almoſt wholly upon *Maſtication*. It ſeems to have two ends: The firſt to bruiſe, and comminute the Maſs, and render its Coheſion more lax, and thereby the ſeparation more eaſie in the *Stomach*: The other is to mix, and, as it were, to incorporate it with the *Saliva*, and ſo render it more apt to Swell and Ferment in the *Stomach*. For all Liquors containing ſome *Air*, are apt to rarify more or leſs in Heat, according to the Proportion they contain of it. But in

Whereto tending.

my opinion, the principal uſe of the *Saliva*, as well as of the *Juice* ſeparated in the *Stomach*, is to facilitate the Mixture or Incorporation of the ſeveral Fluids of the Meat and Drink, after the Solution of the more ſolid part is accompliſh'd, and to unite them under that *Lacteſcent Form* from which they are denominated *Chyle*.

Moſt Conſpicuous in Ruminants.

This Alteration of the *Aliment* in the *Mouth*, is more conſiderable in, and neceſſary to *Ruminants*, and other *Animals* that feed upon dryer and harder *Food* than the *Carnivorous* do: And indeed, Mankind excepted, who enjoy it in no Proportion to them, it ſeems to be peculiar to that ſort of Animals, and accordingly Nature has provided for it by a particular Organization, in giving them a *Plurality* of *Stomachs*; into the *firſt* of which, their Food is uſually tranſmitted, without any other Alteration in the Mouth, than being a little rowl'd, and wrap'd up together. This firſt Stomach, which is call'd the *Rumen*, is the largeſt of them, probably to contain as well the Drink, as the whole crude Maſs of their Aliment, which there lie and macerate together, and thence are tranſmitted again to the *Mouth*, to be *chew'd* and *comminuted* in order to their further *Digeſtion* in the other *Ventricles*, in which uſe it perfectly anſwers the *Ingluvies* of *Fowls*.

The firſt Stomach *or* Rumen

Uſe of the Rumen *illuſtrated by its Structure in* Camels.

This Uſe is incomparably illuſtrated by the Structure of the *Rumen* or firſt Ventricle of *Camels*, in which are divers *Sacculi* that contain a conſiderable quantity of *Water*. This is an admirable Contrivance of *Providence*, to anſwer the Neceſſities of this *Animal*, which living in very dry deſart Places, and feeding upon many ſorts of hard dry Food, ſuch as *Rice*, *Millet*, &c. would very often be in danger of Starving, even amidſt the Plenty of *dry Meat*, which would not digeſt if they had not theſe *Reſervatories* for *Water*, which oftentimes the Countries through which they march does not afford them in a long Tract of Ground. For if the *Water* which they drink, how large ſoever the quantity might be, were not kept apart in theſe Receptacles, it would paſs off with the other Aliment upon the firſt diſcharge of the *Ventricle*, and they would not be able to ſuſtain thoſe long Journies through dry Places, which all Accounts agree they do, for want of *digeſtible* Food.

Uſe of the Sacculi *in the* Rumen *of* Camels.

Third State or Second Stage of the Aliment.

Theſe are all the Alterations that occurr to me to be made in the *Mouth*, after which the Food is tranſmitted directly to the *Stomach* to be digeſted. This Operation we have already deny'd to be perform'd by a *Menſtruum*, either ſeparated in the *Stomach*, or convey'd thither from elſewhere, or by *Attrition* or *Simple Heat*: Though we do not deny this latter to contribute to and promote *Digeſtion*, as it ſerves to actuate the Cauſes of Diſſolution innate to the Aliment it ſelf.

Principle *of* Diſſolution, *what.*

We ſuppoſe, then, all ſorts of *Aliment* naturally to contain in them a *Principle* of *Diſſolution* (if I may be allow'd to uſe that Term) which after the *Vital* and *Vegetative Faculty* is extinct, begins to exert it ſelf to the Diſſolution or Deſtruction of the Subject, and conſequently the *State* of *Decay* may be reckon'd to commence, whenſoever the Acceſſion of new Matter, or ſhifting of the Fluids (which in Plants as well as Animals we call *Circulation*) is at an end, though it does not always immediately ſhew it ſelf in Actual, Viſible Corruption, but proceeds by various Steps or Degrees, according as the Fluids, or containing Solids, are more or leſs diſpos'd to *Activity* or *Reſiſtance.*

The ſame with that of Vegetable Life

This *Principle* of *Corruption*, is perhaps the ſame, which in the State of *Circulation* and *Vegetation* was the *Principle* of *Life*, which being an *Active Principle*, and now deny'd that *Paſſage* or *Vent*, which it had before by the *Progreſſive* or *Circulatory* Motion, makes its way irregularly, and ſo deſtroys the Continuity of the *Solids* in which it is included, and introduces that Change in the Face of the whole Maſs, which is call'd *Corruption.*

The

Air *that* Principle

Has two ſorts of Motion *in* Animal *and* Vegetable *Bodies.*

State of Corruption, *what.*

The *Active* Principle (I here mean) is the Air, which is mix'd in conſiderable quantity with all ſorts of *Fluids*, and is by Experience found as neceſſary to *Vegetable*, as *Animal* Life. This, (though it's Natural, or Eſſential Motion be Expanſive, or *Quaquaverſum*) being introduced into all Bodies, that have any kind of Life, mix'd with the *Fluids*, which make their Juices, has in them two kinds of Motion; one *Expanſive*, by which it communicates that *Inteſtine* Motion, which all Juices have, and by which the containing parts are gradually extended, and grow; the other *Circulatory* or *Progreſſive*, which is not eſſential to it, but is occaſion'd by the Renitency of the *Solid* parts of thoſe Bodies, which obliges it to take that courſe which is moſt open and free, which is through the Veſſels of *Animals* and *Plants*, which courſe being ſtop'd, the *Expanſive* ſtill remains, and continues to act, till by degrees it has ſo far overcome the Reſiſtance of the including Bodies, as to bring it ſelf to an equal Degree of Expanſion with the External Air; which it cannot do without deſtroying the Texture and Continuity, or *Specifick* degree of Coheſion of thoſe *Solids*, which is that which is call'd a *State* of *Corruption*.

All mix'd Bodies Specifically *heavier than the* Atmoſphere.

For all Bodies, whether *Fluid* or *Solid*, that come within our certain Knowledge, are Specifically heavier, and conſequently of a cloſer Texture than the Atmoſphere, and cannot be reduced to a *Par* with it, *Sine Interitu Subjecti.*

Corruption *how* accelerated.

This Expanſive or Deſtructive Quality of the AIR in theſe Bodies, may be two ways actuated, or promoted, either by weakning the *Tone* or *Coheſion* of the Parts of the including Body, and ſo facilitating the Work of the AIR; as it happens when Fruit is bruis'd, which will corrupt in that part much ſooner than in that which is ſound; or by intending the *Expanſive* force of the *Air* it ſelf, by *Heat*, or other co-operating Circumſtances, and ſo helping it to overcome the Reſiſtance the ſooner.

Digeſtion *how perform'd.*

Both theſe ways are uſed in many kinds of *Animal Digeſtion:* The firſt in Maſtication, or the other *Analogous* already ſufficiently ſpoken to: The Second by the *Heat* of the *Stomach*, which forcibly rarifying the *Air*, enables it to rend the including Bodies ſooner to pieces, and ſo to let looſe the *Fluids*, and perhaps likewiſe ſo far to comminute ſeveral parts of the *Solid*, as to make them ſuſtainable in the Liquor; which latter is the Operation that compleats *Digeſtion* in the Stomach.

Not ſo ſoon diſſolv'd by a Greater Heat of Culinary Fire.

It may perhaps be objected, that the ſame Subſtances which the *Stomach* reſolves ſo quickly into Particles, do by every days Experience, bear a much greater Heat of *Culinary Fire*, and for a much longer time in the common Operations of *Cookery*, Roaſting, Boiling and Stewing, than the *Stomach* requires to reſolve them into *Minima*.

The Expedition depends upon the Medium.

To this Objection I anſwer, that this Degree of Expedition depends in great Meaſure upon the *Medium* in which it is perform'd. Thus, in *Roaſting*, Meat will bear a much greater Heat, than either in *Boiling* or *Stewing*, and the ſecond way much fiercer and longer than in the latter: For as *Roaſting* is perform'd in the *open Air*, as the Parts begin externally to warm, they extend and dilate, and ſo let out gradually part of the rarify'd included *Air*, by which means the Internal Succuſſions, on which this Diſſolution depends, are very much weakned and abated. *Boiling* being perform'd in Water, the Preſſure is greater, and conſequently the Succuſſions to lift up the Weight, are proportionable in ſtrength, and by this means the *Coction* is haſtned; and even in this way there are great differences; for the greater Weight of *Water* there is upon the Meat to be boil'd, the ſooner it is done: And in *Stewing*, though the Heat be infinitely ſhort of what is imploy'd in the other ways of Dreſſing, the Operation is yet much more quick, becauſe it is perform'd in a pretty cloſe Veſſel, and full, by which means the *Succuſſions* are more often repeated, and more ſtrongly reverberated.

Roaſting, Boiling *and* Stewing, *how differenc'd in point of* Celerity.

How in Papin's Digeſtor.

Theſe are the common Obſervations of *Cooks*: But there is a way which yet more exactly reſembles the Operation of the Stomach, which is by the *Digeſtor* invented by *Monſieur Papin*. In this the Meat is put together with ſo much Water as ſerves exactly to fill the Engine, which done, the Lid is ſcrew'd on cloſe, ſo as to admit of no external Air; and is, with two or three lighted Charcoal, or a ſingle ſmall Lamp Flame, reduc'd to a perfect Pulp, or rather a Liquor, in a very few Minutes, as in ſix, eight, ten, twelve or ſixteen, according to the toughneſs of the Matter to be digeſted, or the Augmentation of this little Fire, which will, in a very ſhort time, this way, diſſolve the hardeſt Bones themſelves. The ſtrict cloſure of this Engine, ſo as to exclude the Intervention, or eſcape of Air, is the Occaſion why the inward Succuſſions of the contain'd Matter, being equable and ſtrong, reſolve the whole into one ſeemingly *Homogeneous* Body, and mix the *Aqueous*, *Saline*, *Oleoſe*, and other Particles, ſo ſtrongly together, as not to be eaſily at leaſt ſeparated, but while hot, to appear one Liquor, and when cold, a uniform Gelly, of a ſtrength proportionate to the quantity of *Fleſh* or *Bones* diſſolved in the Water.

Analogy between this Operation and the Digeſtion *of the* Stomach.

This Experiment holds great *Analogy* with the *Operation* of the *Stomach*, which though it does not ordinarily diſſolve ſuch hard Bodies, nor others ſo quick, yet according to the Degree of its Stricture, and the Proportion of its Heat, it may be ſaid to do the ſame thing. For as the *Stomach* naturally cloſes upon the Aliments that deſcend into it; ſo it ſtrictly embraces its Contents when full, and by keeping out any Extraneous *Air*, fortifies and invigorates the Succuſſions of that, which is naturally contain'd in the *Aliment*, which it receives: Which, however little it may be, is thereby enabled to break, and reſolve into ſmall Particles, the Bodies which included it ſo mix'd, *inter Minima*, with its Humours.

Chylification, *how perform'd.*

Theſe, being thus reduc'd into *Fluor*, and intimately mix'd with the Liquids of the Drink, and Juices of the Stomach, compoſe that *Lacteſcent Liquor*, which is call'd *Chyle*, which is nothing but a Mixture of *Oily* and *Aqueous* Parts, incorporated together with the *Saline*, and which, while it remains mix'd with the groſſer parts in the Stomach, make a *thick*, *whitiſh*, *partly fluid Maſs*, which we call the *Chyme*, which as ſoon as it is reduc'd to a Conſiſtence, looſe enough to be obedient to the Preſſure and *Periſtaltick* Motion, is gradually work'd out through the *Pylorus* into the *Duodenum*, Chyle, *how receiv'd into the* Lacteals.

along the ſides of which, and the reſt of the *Inteſtina tenuia*, the *Vaſa lactea* are planted, into whoſe extreamly minute Orifices, the thinner and more Fluid part of this Maſs, is preſs'd by the natural Contraction, and *Periſtaltick* Motion of the Guts, which is that *Chyle* of which the *Blood* is afterwards compos'd, and in Women that give Suck the *Milk* more immediately.

Appetite, *how rais'd.*

When all the *Chyme* and *Chyle* is preſs'd out, the *Stomach*, which follows the Motions of its Contents, is again by means of its Muſcular Coat, reduc'd to a State of Contraction, and by that means the Inner is brought to lie in Folds, which touching, and by means of the *Periſtaltick* Motion, rubbing lightly upon one another, produce that gentle Senſe of *Fretting* or *Vellication*, which we call HUNGER, which being felt firſt in the upper Orifice, which is firſt evacuated, begins therefore firſt to prompt us to repleniſh: But as by degrees the Remainder of the Contents are expell'd, this Friction or Rubbing of the Membranes upon each other, ſpreads gradually over the whole *Stomach*, and renders our *Hunger* more urgent and impatient, till by a new Repletion we take away the Cauſe.

This Hypotheſis *not liable to the Objections which the former are.*

This is all the *Fermentation*, and all the *Menſtruum* that are requir'd, to account for all the Natural *Phænomena* of *Hunger*, *Digeſtion*, and *Chylification*; and though they who admire Pompous Operoſe Proceedings, may think it too ſimple a piece of *Mechaniſm* for ſuch great Effects, yet it is more ſufficient than any of thoſe magnificent Ways, which any of the moſt luxuriant Fancies have been yet able to invent, and is incumbred with none of thoſe Inconveniencies which have attended all the *Hypotheſes* by different *Menſtrua*, and *Fermentations* that I have yet met with: For when any of thoſe ſharp provoking Liquors, which they have imagin'd have (as in Morbid Caſes they ſometimes do) affected the *Stomach*, the *Appetite* has been always vitious, and the *Digeſtion* bad. For in ſuch caſes the Repletion with wholſom Food, not being ſufficient to take off the Acrimony of ſuch Humours, the *Fancy* has been upon the Hunt, as Sick *Fancies* generally are, for ſomething out of the way, and perhaps extravagant and hurtful; and when ſuch Humours are ſent in Plenty upon the *Stomach*, they are by the Heat of the Part rarify'd into thoſe Flatulencies, which are vulgarly call'd *Wind*, which by diſtending the *Stomach*, hinder the Folds of the inward *Nervous* Membrane from approaching one another, and ſo deſtroy natural *Appetite*, as they do *Digeſtion* likewiſe, by hindering the *Stomach* from cloſing exactly upon the Aliments, and ſo obſtructing it in its Office, which requires that Stricture.

Pricking Humours *upon the* Stomach *a* Diſeaſe.

Deſtroy Appetite *and* Digeſtion.

Why hard Drinking *does the ſame.*

The ſame way it is that hard Drinking deſtroys *Appetite* and *Digeſtion:* For by keeping the *Stomach* conſtantly diſtended with Liquor, the Tone of it is deſtroy'd, and till it can be recover'd again, they never return.

We might by the ſame way account for all the other Diſeaſes of the *Stomach*, in which *Appetite* or *Digeſtion* are affected; but to do that, would take up more room than the Deſign of this Work allows, and this Chapter is already ſwell'd to too great a Bulk.

TAB. II.

FIG. I.

THE Cavity of the *Abdomen*, after its *Muſcles* and *Peritonæum* are remov'd, and the *Stomach*, *Inteſtines* and *Meſentery* taken out, to ſhew as many of the reſt of its *Viſcera in Situ* as could well be expreſs'd in one View; the *Skin* and *Fat* being taken off; the *External Muſcles* appear on the *Head*, *Arms*, *Breaſt* and *Thighs*.

A The Superior Convex ſurface of the *Liver*.

B Its Inferior Concave ſurface.

C The *Ligamentum Umbilicale* turned up on the Cartilaginous endings of the Ribs.

a, The *Gall*-Bladder fill'd with *Gall*.

b, The *Ductus Cyſticus*.

c, The *Ductus Hepaticus* joyning with the *Cyſticus*, and making the *Ductus Communis*.

d, A Probe inſerted into the *Ductus Pancreaticus*.

e, Another Probe in the ſame Orifice or Caruncle in the *Duodenum* g; inſerted into the *Ductus Communis Bilarius*.

f, The Body of the *Pancreas*.

g A Portion of the *Duodenum* opened, to ſhew the exit of the *Bilary* and *Pancreatick Ducts*, as above at d, e.

h The Emulgent Veſſels of the left Side, under which, near the great Artery at l, lies the *Receptaculum Chyli*, expreſs'd Fig. III.

i i The two *Kidnies*, of which the Right is ſomewhat lower than the Left.

k The *Spleen*.

l The deſcending Trunk of the *Great Artery.*

m The aſcending Trunk of the *Vena Cava.*

n n The two *Spermatick Arteries* ſpringing from the Trunk of the *Artery* at l.

o o The *Two Spermatick Veins*, the *Right* emptying it ſelf into the *Vena Cava*, m; the Left, into the *Emulgent Vein* h.

p p The *Spermatick Veins* and *Arteries* paſſing on the *Pſoas Muſcles* towards the *Teſtes.*

q q q The two *Vreters* deſcending from the *Kidnies* to r.

r The *Bladder* of *Vrin* here blow'd up.

s The *Vrachus* turn'd down.

t t The *Vaſa Deferentia* paſſing from each Teſticle to the *Veſiculæ Seminales.*

u u The *Proceſſes* of the *Peritonæum*, covering the *Spermatick Veſſels* as they paſs to the *Teſtes.*

w w The *Teſtes.*

† † The two *Cremaſter Muſcles.*

✠ ✠ The *Glandulæ Inguinales.*

x x The *Spines* of the *Oſſa Ilii.*

y The *Os Pubis*, where the *Ligamentum Suſpenſorium Penis* ſprings, here expreſs'd.

z, The *Dorſum Penis.*

D D The *Cartilaginous* endings of the *Ribs.*

E E The *Boney* parts of the *Ribs.*

** The Diviſion that is commonly made between the *Cartilaginous* and *Boney parts* of the *Ribs*, to raiſe the *Sternum* F G, in order to inſpect the *Viſcera* of the *Thorax.*

F, The Enſiformal Cartilage.

G, The *Sternum* or *Os Pectoris.*

H, Part of the *Clavicle* bared.

I. The fore part of the *Os Hyoides.*

K K, The *Glandulæ Maxillæ inferioris.*

L, The inferior edge of the lower Jaw-bone bared.

M, The *Os Jugale.*

N, The *Parotid Gland.*

O O, Parts of the *Muſculus Serratus Major Anticus,* that are indented with the *Obliquus Deſcendens.*

P, The *Trunk* of the *Artery,* that is liable to be prick'd in letting Blood in the Arm.

Q, Part of the *Faſcia Tendinoſa* that ſprings from the *Muſculus Biceps,* and paſſes over the *Artery* P.

R, The *Trunk* of the *Nerve* appears alſo at the Flexure of the *Cubit.*

S, The *Ligamentum Anulare,* or *Tranſverſale Carpi,* by which the *Tendons* bending the Fingers are kept in, when their Muſcles are in Action.

T, The *Tendon* of the *Muſculus Membranoſus,* near its Inſertion to the *Tibia* and *Fibula.*

V V, The *Patellæ.*

W, The lower *Appendix* of the *Thigh-bone.*

X. The *Tibia.*

1. The *Muſculus Orbicularis Palpebrarum.*

2. *Zygomaticus.*

3. *Buccinator.*

4. *Temporalis.*

5. *Maſſeter.*

6. Parts of the *Digaſtrick Muſcles* at their terminations.

7. Part of the *Mylohyoideus* under the *Digaſtricks.*

8. Part of the *Coracohyoideus.*

9. *Sternohyoideus.*

10. 10. *Maſtoideus* on both ſides.

11. A ſmall Portion of the *Levator Scapulæ.*

12. The *Pectoral Muſcles,*

13. The *Deltoides.*

Ψ. Part of the *Coracobrachialis.*

14. The *Biceps Cubiti.*

15. Part of the *Brachiæus internus.*

16. *Supinator Radii longus.*

17. Part of the *Radialis Extenſor Carpi.*

18. *Radialis Flexor Carpi.*

19. *Palmaris Longus.*

20. *Flexor Digitorum perforatus.*

21. *Ulnaris Flexor Carpi.*

22. Part of the *Tendons* that extend the *Thumb.*

23. *Abductor Pollicis*; adjacent to which, towards the Palm, lies the *Flexor ſecundi Oſſis Pollicis.*

24. *Abductor Minimi Digiti*; on which at △ is placed the

(△) *Palmaris brevis.*

δ. The Expanſion of the *Palmaris longus* in the Palm.

ε ε. The *Tendons* that bend the Fingers.

25. Part of the *Extenſor Communis Digitorum* in the left Hand.

26. *Abductor Pollicis ad Dorſum Manus.*

27 27. The *Pſoæ Muſcles*, over which the *Spermatick Veſſels* and *Ureters* paſs.

28. *Muſculus Iliacus internus.*

29. *Sartorius* on both ſides.

30. *Muſculus Communis Membranoſus.*

31. The *Glutæus Medius*, cover'd with the Tendinous Expanſion of the *Glutæus Maximus.*

32. *Rectus Femoris.*

33. 33. *Vaſtus externus.*

34. 34. *Triceps.*

35. *Gracilis.*

36. *Vaſtus internus.*

FIG.

F I G. II.

A Thin ſlice of the *Gall-Bladder* view'd with a Microſcope, to ſhew its Membranous Structure, which is here diſtended and dry'd by blowing into its *Blood-Veſſels*, whereby its *Parietes* became diſtended.

A A The external and internal Membrane.

B B Their Internal Membranous *Lamellæ*, framing a ſort of Net-work by means of the *Air* inſinuating into it. The like may be ſeen in the *Bladder* of *Urine*, or any Membranous part, if you inſert a Blow-pipe between its *Lamellæ*, or force Wind into its Blood-Veſſels. It is by the ſame means *Butchers blow* up their *Veal*, either by forcing their Wind under the Skin near the *Navel* of the Creature, they afterwards drive it over the whole Body; or by *pricking* the *Skin* between the Fore-Legs, they ſuddenly pull the Legs from each other, and ſo let in the external Air. This Practice, though forbidden, is commonly done in this City, inſomuch that you can hardly meet with a Shoulder of *Veal* without *Inflation*.

F I G. III.

THE *Receptaculum Chyli*, and part of the *Ductus Thoracicus*, fill'd with *Mercury* and dry'd.

A A A Three Trunks of the *Receptaculum Chyli*: This Diviſion of it, has not been taken notice of by Anatomiſts, which makes me ſuſpect the Deſcriptions we have hitherto had of it, are from *Quadrupeds*, in whom, by reaſon of the Horizontal Poſition of this part, one *Receptacle* of *Chyle* may be ſufficient. But in *Humane* Bodies, its Poſition being *Perpendicular*, it ſeems neceſſary this *Receptacle* ſhould be thus divided, before it paſſes under the Trunk of the *Great Artery*, where it meets with repeated Compreſſions, by means of the Pulſation of the *Artery*, which drives up the Contents of the *Thoracick Duct*.

B One of the *Lacteal* Veſſels ty'd up, by which the *Mercury* was injected.

C The internal Surface of the Left *Lumbal Gland*, that lay on the Trunk of the *Artery* below the *Emulgents*.

D The *Lympheducts* of the inferior Parts, before they empty themſelves into the *Lumbal Gland* C.

E F. *Communicant* Branches of *Lympheducts*, between the *Right* and *Left Lumbal Glands*.

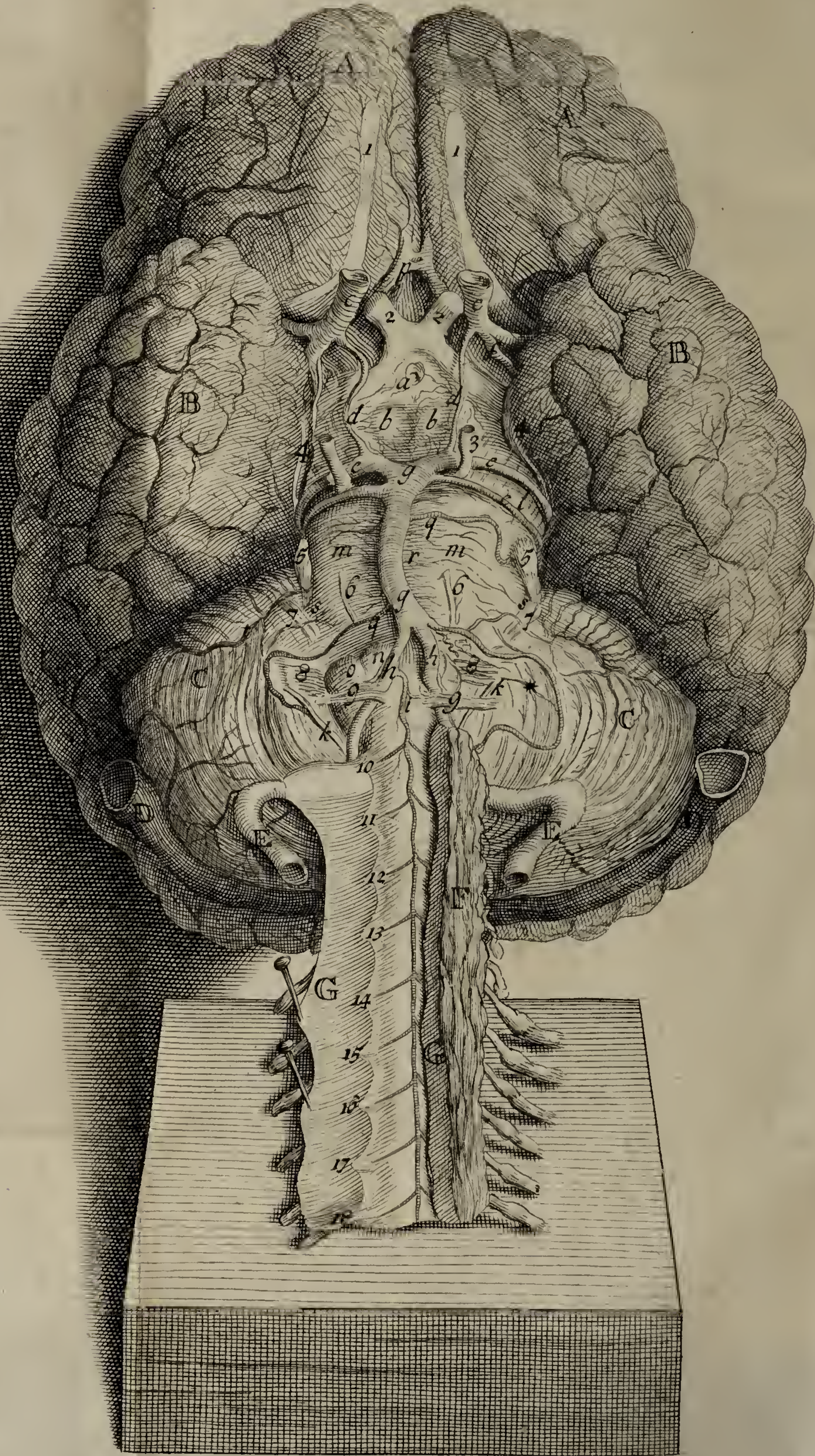
G The *Ductus Thoracius* above the *Diaphragm*, where it lies between the deſcending Trunk of the *Great Artery*, and *Vertebræ* of the *Thorax*.

H About this part of the *Duct*, its *Valves* are very Conſpicuous, if you open it.

I. One of its Diviſions (above which are divers others, that could not be expreſs'd in this Page) whereby the Aſcent of the *Chyle* may be the better carried on.

CHAP.

pag. 481. *Tab. XV.*



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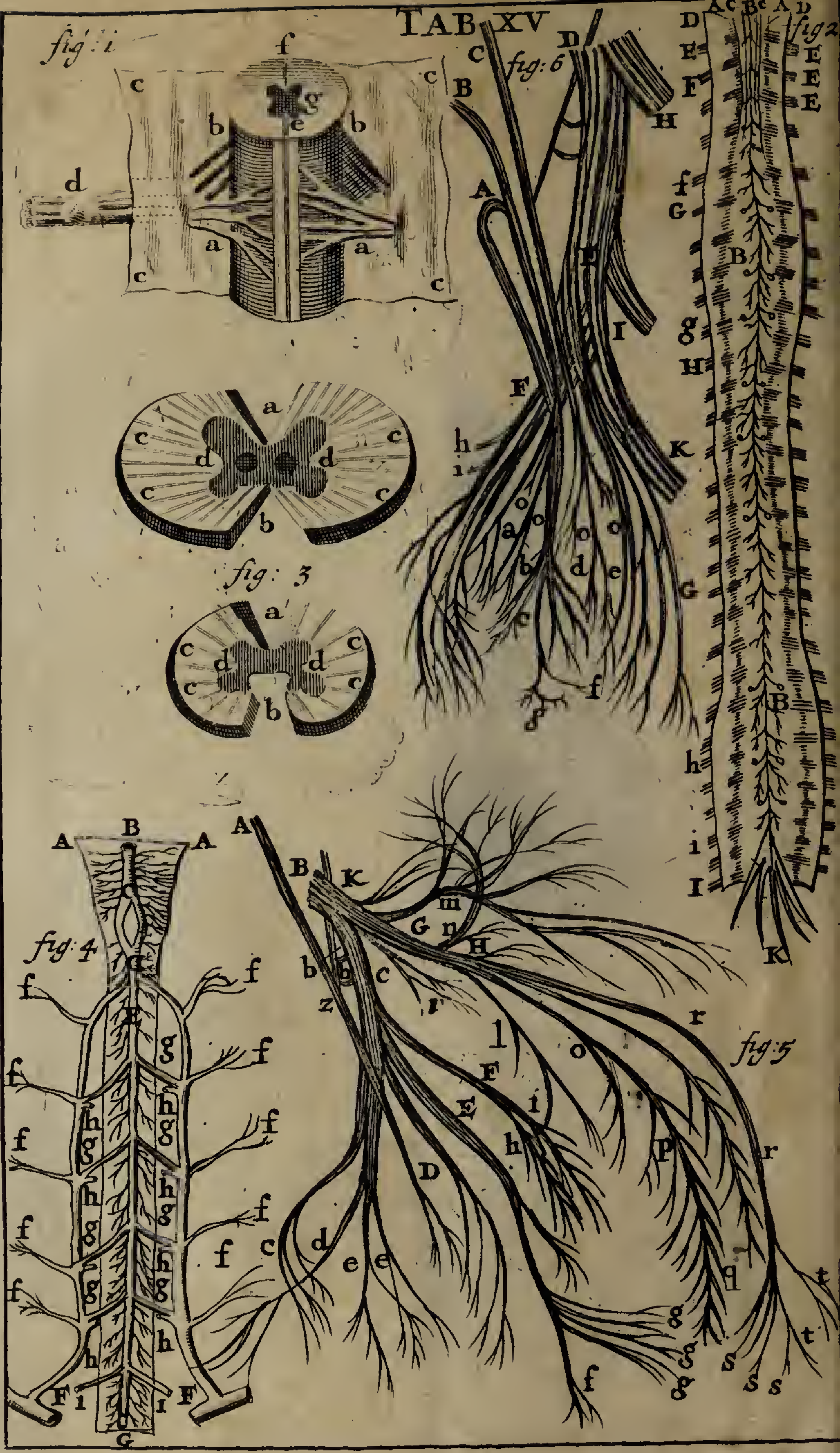
TAB XV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CHAP. XV.

Of the PANCREAS.

SYLLABUS.

Eorum quæ exhibet

- *Pancreas*
  - *Subſtantia*
  - *Color*
  - *Figura*
  - *Vaſa*
    - *Arteriæ*
    - *Venæ*
    - *Nervi*
    - *Lymphædactus*
  - *Ductus Wirtzungi cujus*
    - *Duplicitas*
    - *Oſtiola*

Pancreas.

Tab. II. Fig. I. f.

THE PANCREAS is a *conglomerate Gland*, ſituate near the firſt *Vertebræ* of the *Loins*, at the bottom of the *Stomach* on the hinder part of it, adhering, at its thicker Extream, to the *Duodenum*, and from thence extended towards the Spleen.

Its Subſtance.

It conſiſts of innumerable ſmall *Glands*, which, though ſeparately being very firm, cohere but looſely together, and therefore make the whole Body of it ſeem lax. Theſe *Glands* are colligated as well by the *Veſſels*, as by a *Membrane* proper to every one of them, and altogether are cloth'd with a very thin Membrane from the *Peritonæum*, which, if you blow into the *Excretory Duct* of the *Pancreas*, will let out the *Air* at ſeveral places.

Colour. Its Colour is, what we in *Engliſh* uſually call a *Fleſh* Colour, *White* ſomewhat diſcolour'd with *Red.*

Figure. Vid. App. Tab. Blancard. xxviij. The *Figure* of it is ſomewhat like to that of a *Dogs Tongue*, but longer, being uſually about eight or nine Fingers breadth long, and about two, or two and an half broad, and about one thick. Its weight, according to Dr. *Wharton* and *De Graaf* is about four or five Ounces.

Veſſels. Its *Arteries* come from the *Cæliack*, both *Right* and *Left*. Its *Veins* go the *Porta*. The *Nerves* come from the *Hepatick Plexus*, which is form'd under the *Liver* of ſome Branches of the *Intercoſtals*.

Excretory Duct. It has a *peculiar Duct*, firſt diſcover'd by *Wirtſungius*, and therefore call'd by his Name *Ductus Wirtſungianus*. This *Duct* is about the bigneſs of a Ravens Quill near the *Inteſtine*, though more ſlender in parts remoter from it. It is ordinarily accounted and deſcribed as a ſingle Duct: But *De Graaf* takes notice, that he has ſeen it double ſometimes in Men, and ſays, it is generally ſo in *Pheaſants*, and many other *Fowls*: But it has hapned to be ſo in moſt if not all the Humane Bodies, and Dogs, that I have examin'd about it, ſince I took notice of that Suggeſtion. *Frequently double.*

It empties it ſelf into the *Duodenum* generally by two ſeveral Mouths: One only of which is taken notice of by Anatomiſts, and opens it ſelf four or five Fingers breadth below the *Pylorus*; and not ſeldom at the ſame *Foramen* with the *Ductus Communis Choledochus*. The other is ſomewhat lower, but at an uncertain diſtance. It has no *Papilla*, and is much ſmaller than the other, but is eaſily diſcover'd by blowing into the Larger.

Oſtiola.

Tab. II. Fig. I. d.

CHAP. XVI.

Of the SPLEEN.

SYLLABUS.

Partium & Notabilium

Vide Tab. II. Fig. I.

- *Lienis*
  - *Color*
  - *Figura*
  - *Situs*
  - *Connexio*
  - *Tunicæ*
    - *Exterior Communis*
    - *Interior Propria—in qua Foramina*
  - *Cellulæ*
  - *Glandulæ—Malphigii*
  - *Vaſa*
    - *Arteriæ*
    - *Venæ*
    - *Nervi*
    - *Lymphatica*

Spleen.

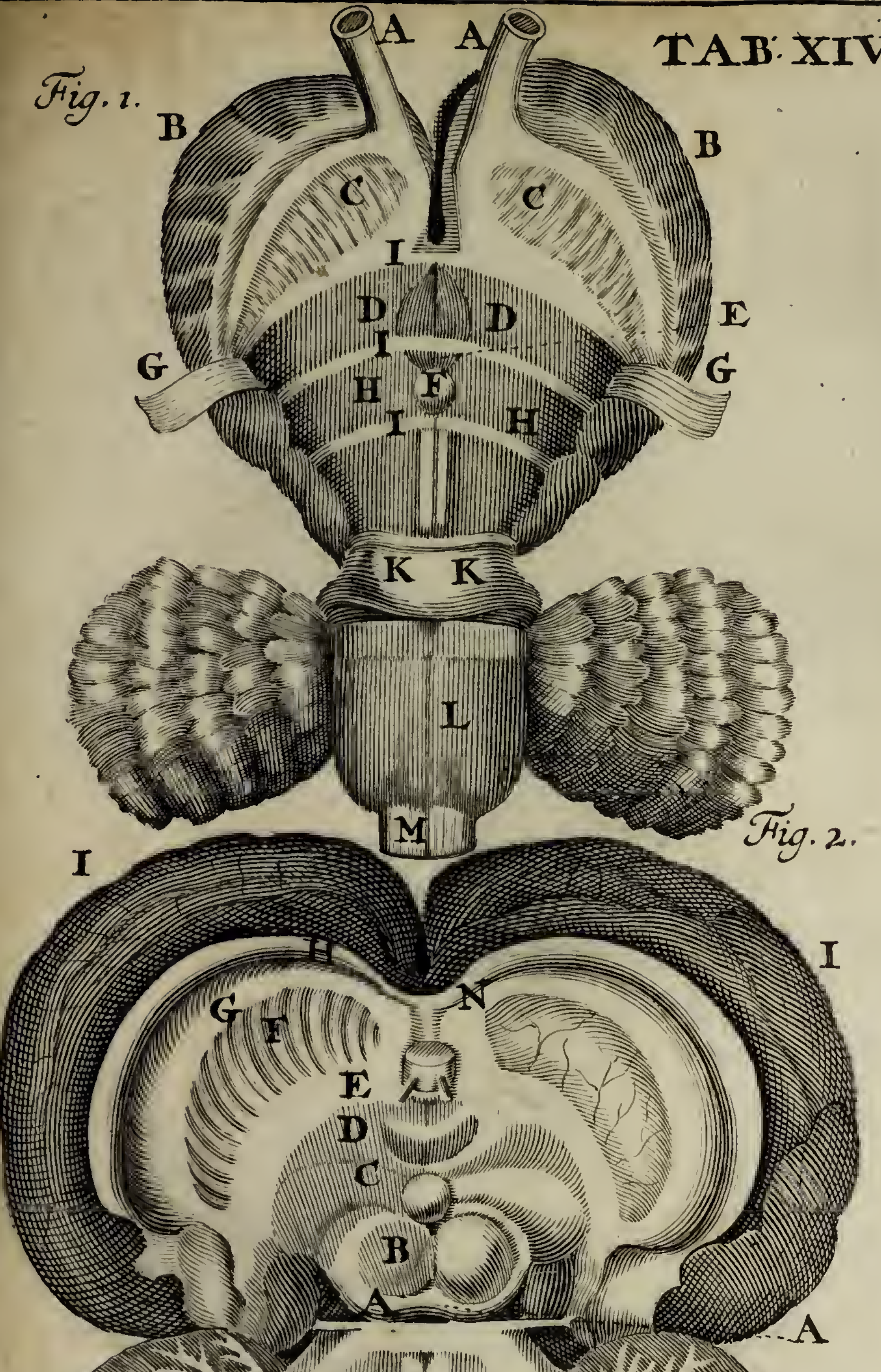
THE SPLEEN is a ſoft ſpungy *Viſcus*, appearing externally of a darkiſh diſcolour'd red, or rather blewiſh Colour. Its *Figure* ſomewhat approaching to that of a Tongue, though in that particular the appearance is not very conſtant, it being ſometimes triangular, ſometimes almoſt round. Perhaps Authors have generally deſcrib'd its Figure from the *Spleen* of Brutes, which has in moſt of them a nearer reſemblance to a Tongue, than the *Human* has. From ſuch likewiſe the Figures of *Blancard*,

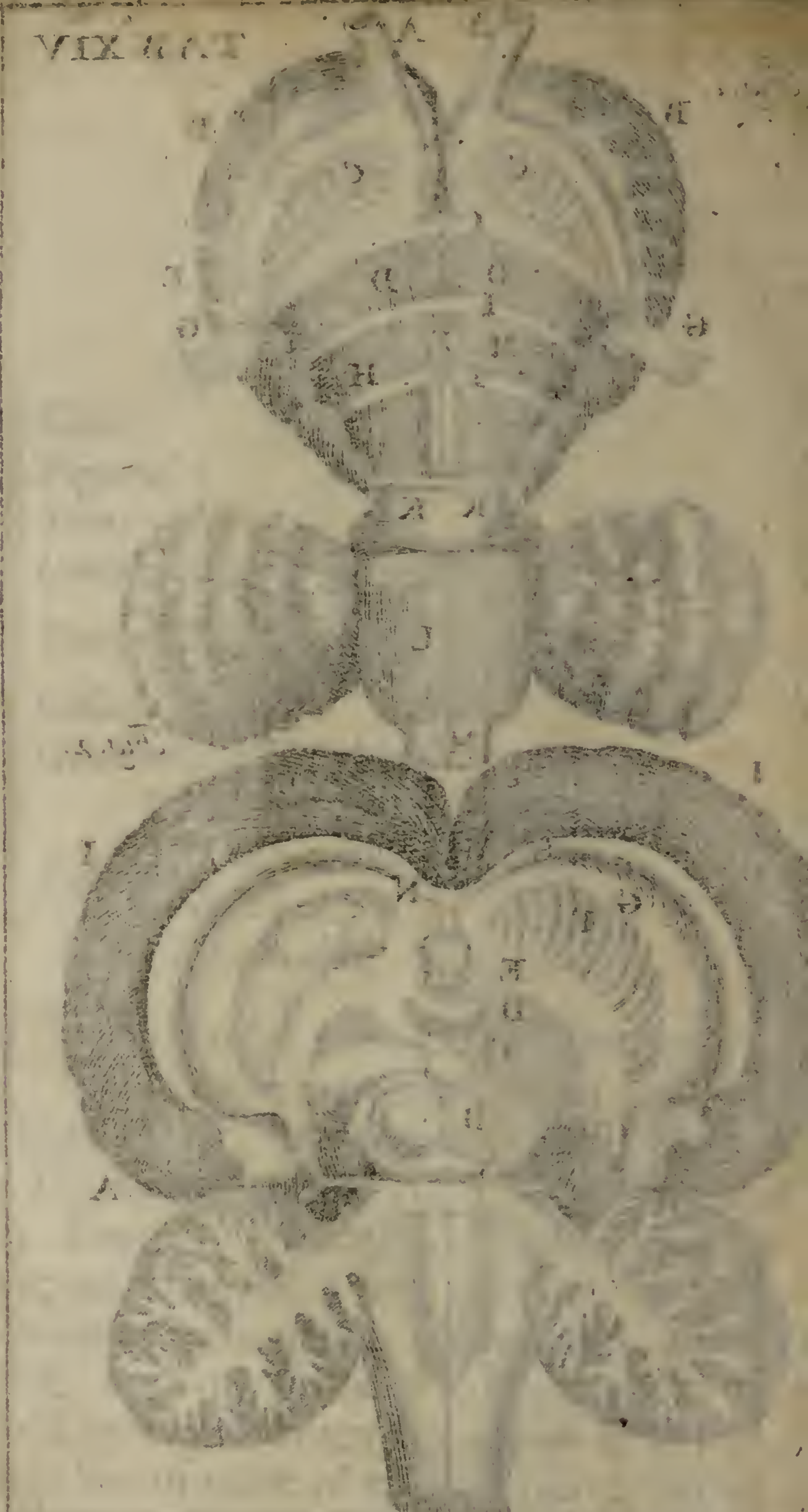
Colour.

Figure *uncertain, as the Number alſo.*

Vid. App. Tab. Blancard. XXX. Fig. 1. Fig. 2.

TAB. XIV.

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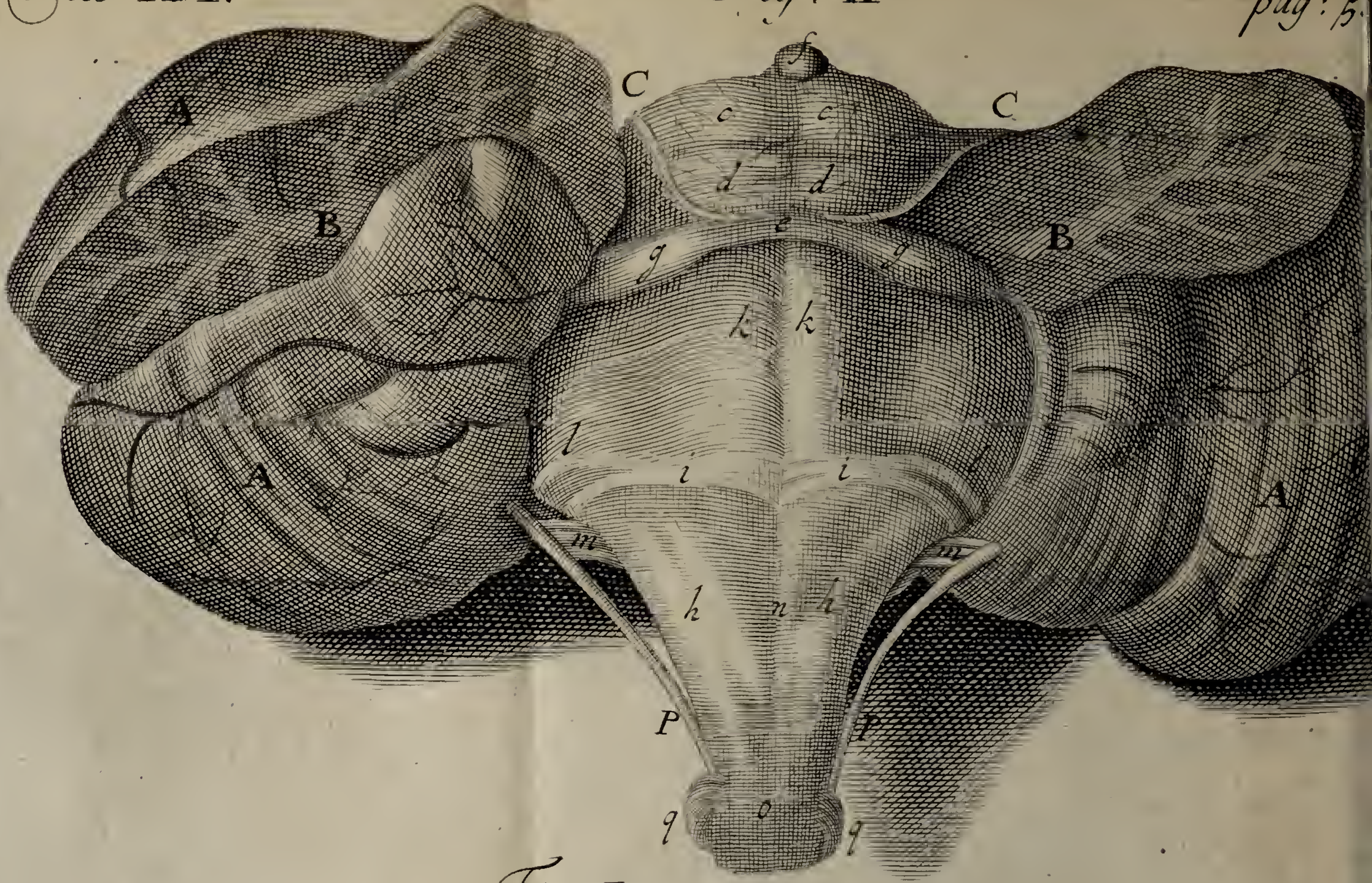
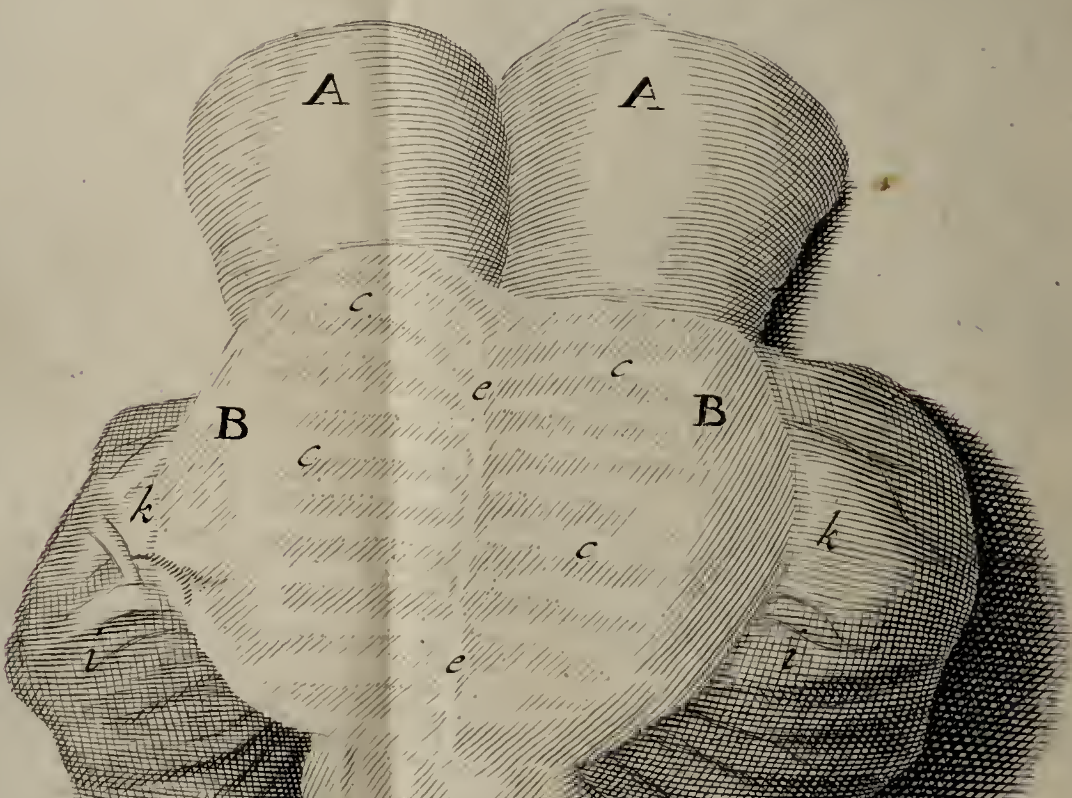
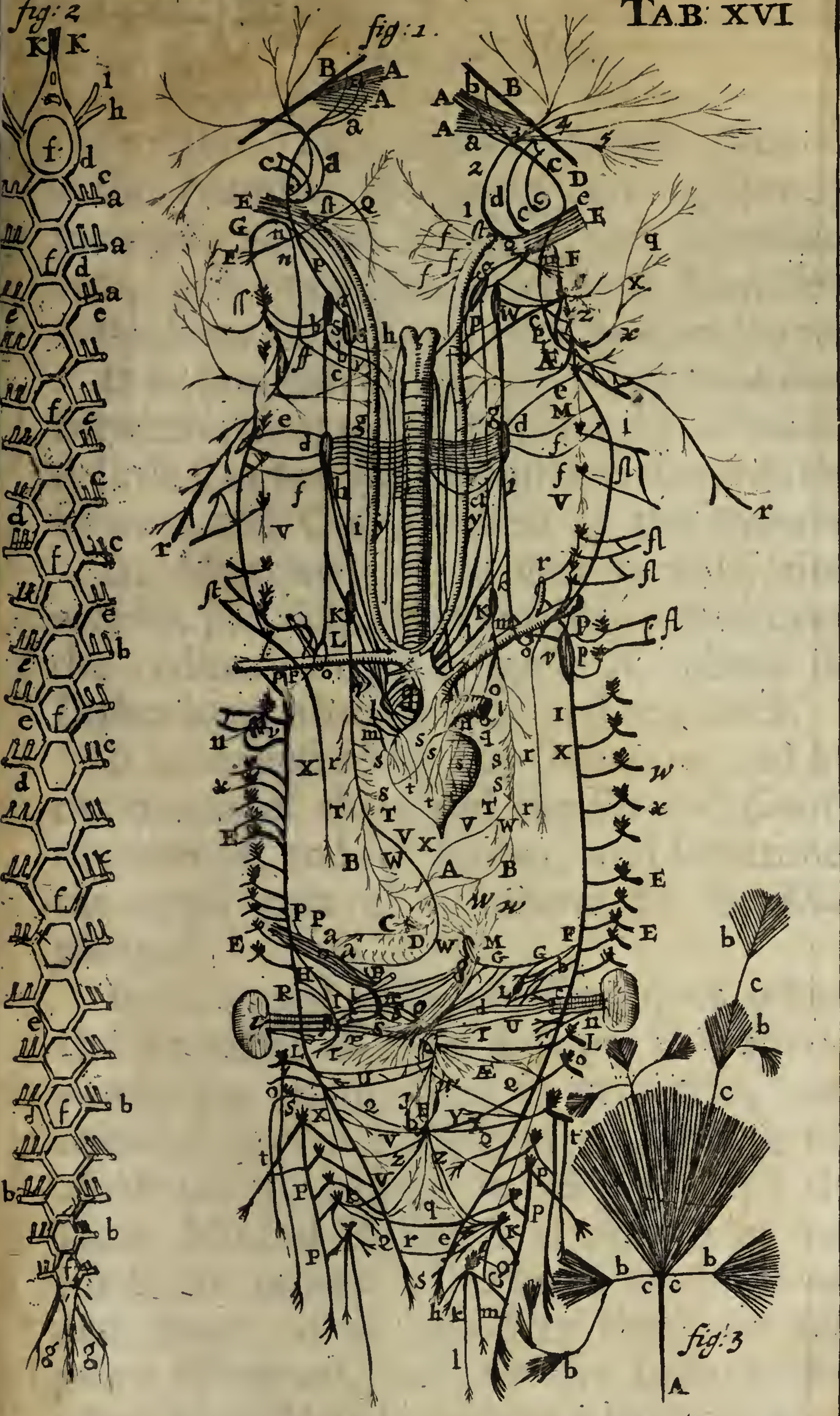


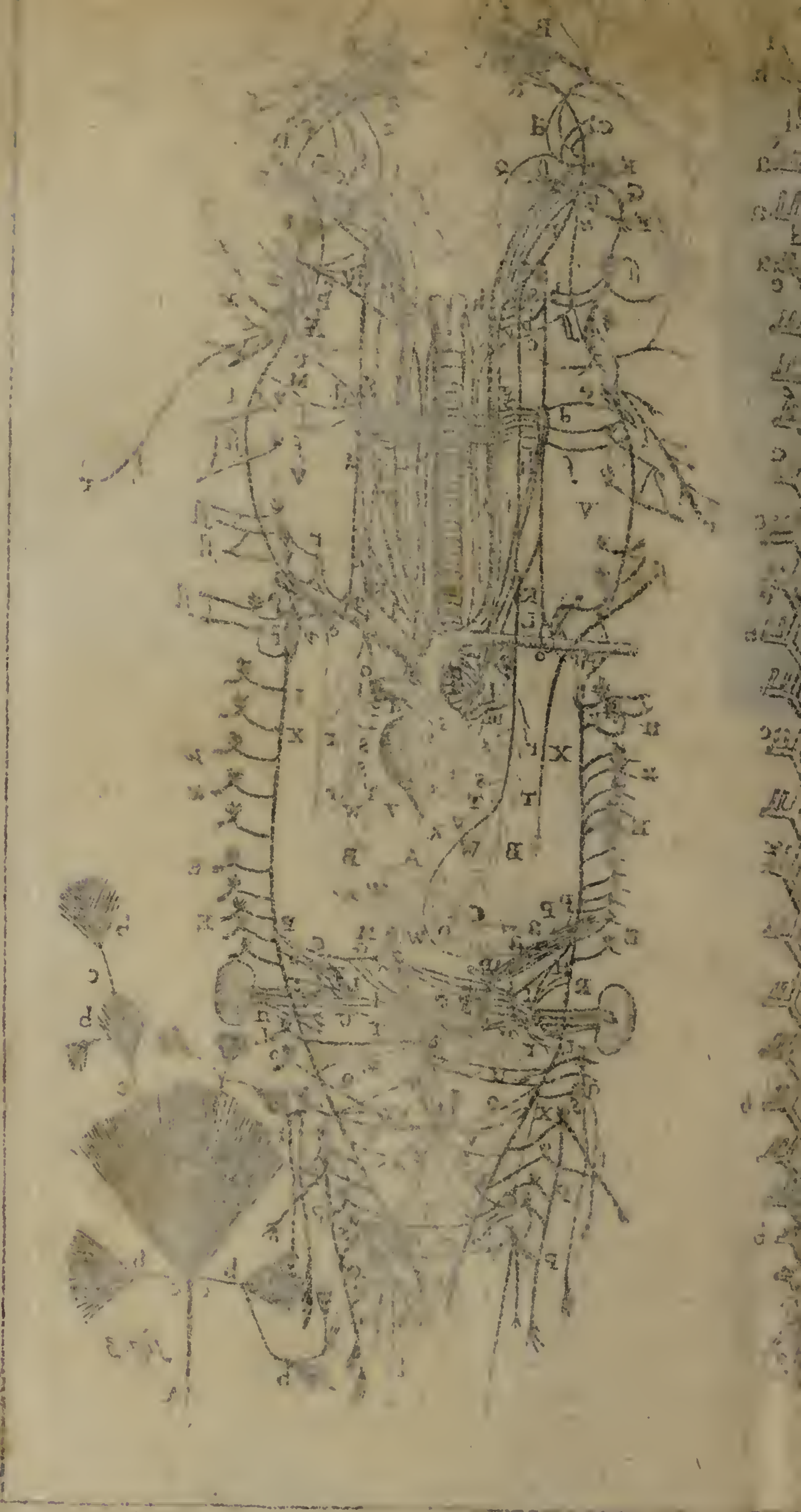
Fig: I.



TAB. XVI

fig: 2 fig: 1 fig: 3

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here referr'd to, ſeem to be drawn. Neither is the Number abſolutely certain, though generally we find but one, yet ſometimes two, and ſometimes three have been ſeen in the ſame ſubject, as divers *Anatomiſts* aver.

Situation

It is ſituated in the left *Hypochondrium*, between the *Spurious Ribs* and the *Stomach*: A little Convex on the Surface towards the former, and Concave next to the *Stomach*.

Magnitude.

Its Magnitude is ſo very various, that it is not preciſely determinable: However, the ordinary length aſſign'd is, about ſix Inches long, three broad, and one thick.

Connexion.

It is connected by the *Omentum*, and by the means of that, and the *Blood-Veſſels* to the *Stomach*, and *left Kidney*, and ſometimes the upper part of it adheres to the *Diaphragm*.

Coats.

It is cover'd with two *Tunics*, of which the External is deriv'd from the *Peritonæum*, but naturally is ſo very thin, and liable to tear in Diſſection, as requires the *Anatomiſt* to handle it very gently: In ſome Morbid Bodies it is very firm and thick, in others it becomes *Cartilaginous* and *Boney*; it is joyn'd to the *inner* and *proper Membrane*, only by the Intervention of the *Blood*-Veſſels, whence it happens, that, upon the Separation of them, there appear upon the Surface of the *inner Membrane*, little black or bloody Points, ſhewing where thoſe *Veſſels* were broken off: Through

Exterior Coat.

theſe *Holes* or *Orifices* it is that the *Air* eſcapes, upon attempting to blow up the *Spleen* by the *Artery* or *Vein*, after this *outer Membrane* is ſeparated from it; which Experiment generally ſucceeds in *Quadrupeds*, whilſt this Membrane is left on. For if this Membrane be intire, when the *Spleen* is taken out, it may be blown up by any of its *Blood*-Veſſels, or have its *Lymphaticks* fill'd with *Mercury*, if all the Veſſels be carefully tied, except thoſe you blow, or pour into.

Interior Coat. The inner *Tunic* conſiſts of Fibres very curiouſly interwoven, from which it ſends over innumerable Threads from one ſide to the other.

Cells. From this Coat, very probably, are deriv'd thoſe innumerable *Cells*, or little Bladders, which make up the main Bulk of the SPLEEN. Though *Malpighius* rather thinks them to ariſe from the *Venous Duct*, a difference not very material. Theſe *Cells* are for Number, Figure, and Magnitude, *How ſhewn* various and indeterminate, and beſt ſhewn by blowing up the *Spleen* through the *Trunk* of the *Vein*, and then laying a Varniſh upon it, and drying it in the open *Air*, after which cutting it, the Cells remaining diſtended, ſhew their Figure and Capacity. Theſe Cells communicate with one another, and exonerate themſelves into the *Trunk* of the *Vein*.

The inſide of theſe Cells is furniſh'd with divers Glands, according to *Malpighius*, which adhering to one another, ſix, ſeven, eight, or more together, form a ſort of ſmall *conglomerate Glands*, in which the *Arteries* and *Nerves* ſeem to terminate. Their Exiſtence is however very queſtionable, as not appearing plainly here, nor in the *Penis* at all, whoſe Structure is the ſame, but by no Body ſaid to be Glandulous. Glands *of* Malpighius.

Its *Arteries* come from a large Trunk of the *Cæliack*, and are contorted in their Progreſs to the *Spleen*: The *Veins* go to the left Branch of the *Porta*, and are call'd from the *Viſcus*, the *Splenic Artery* and *Vein*. Theſe Blood-Veſſels are in reſpect to the Bulk of the *Viſcus* very large, and manifeſtly communicate with each other. For whether you pour Water into the *Artery* or *Vein*, it preſently diſcharges it ſelf promiſcuouſly by either; ſo that here is no ſign of any *Valve*, nor indeed through the whole *Porta*, whatever ſome have told us. *Blood-Veſſels.*

Its *Nerves* come from the *Plexus*, call'd by *Willis Plexus Lienaris*, which lies near the bottom of the *Stomach* on the left ſide. All theſe Veſſels, as ſoon as they enter the *Spleen*, are wrapt up in one common *Capſula* or *Membrane*, and are plentifully diſtributed through the whole Subſtance of the *Spleen*, the *Nerves* every where accompanying the *Arteries*, and circling them variouſly Nerves.

variouſly about. Of the *Vein* within the *Spleen*, there are divers Branches or Trunks, which on all ſides, as well towards the Subſtance of the *Spleen* as the *Arteries*, are punch'd through with many little *Holes*.

Lymphaticks.

The *Spleen* abounds with *Lymphæducts*, in proportion to its Magnitude equally, if not more than any part of the Body: But theſe do not ſo plainly appear, unleſs in live Diſſections, with a Ligature upon the Veſſels, or on blowing into the Veins.

Eaſie Preparation of the Spleen *by* Mercury.

The *Anaſtomoſes* between the *Arteries* and *Veins* of the *Spleen*, have been already obſerv'd to be more plain in this *Viſcus*, than any other part of the Body; which will yet more fully appear, if *Mercury* be pour'd into either *Vein* or *Artery*. For it indifferently fills both from either; and if the *Spleen* be hung up ſo fill'd, with the Veſſels tied for three Weeks, or a Month, and then cut, it exhibits them all in their proper Figures and Dimenſions.

Spleen *receives a greater Proportion of* Blood *than any other part.*

By the *Diameter* of the *Arteries* and *Veins* thus exhibited, as well as from the Capacity of the *Trunk* of the *Splenic Artery*, which equals that of both the *Meſenteric Arteries*, this *Viſcus* appears to be evidently furniſh'd with a greater Proportion of Blood, than any other in the Body.

Ingenious Conjecture of Mr. Cowper, *concerning the* Uſe *of the* Spleen

Mr. Cowper from hence, and from the manifeſt immediate Communication between the *Arteries* and *Veins* in this Part, draws a very Natural Conjecture at the *Uſe* of this *Viſcus*, at leaſt of this peculiar Mechaniſm. He imagines it to be a Subordinate Circulatory Organ, and that, by this Congreſs of the *Arterial* and *Venous* Blood here, an *Impetus* is communicated to the latter, by which its Progreſs through the Ramifications of the *Porta* to the *Cava* is promoted, which otherwiſe would be ſo broken by the double Ramifications of the *Porta*, as to want Strength ſufficient to carry it to the Heart. This Hypotheſis, deriv'd purely from the Mechaniſm of the Part, carries a Face of great Probability, and deſerves to be conſider'd by all the Learned and Judicious. But whether it be the *Sole* or *Ultimate Uſe* of the *Viſcus*, I ask leave ſtill to doubt.

Other Uſe *uncertain.*

Many other *Hypotheſes* have been offer'd concerning the Uſe of this *Viſcus*: But none of them ſo ſatisfactory to me, as to induce me to amuſe the Reader about any of them, and therefore I ſhall leave it to farther Enquiry, intending my ſelf to proſecute, at more leiſure, ſome Suſpicions which I have entertain'd concerning it, which I think not yet ſufficiently confirm'd, to offer them to the Publick.

CHAP. XVII.

Of the LIVER, GALL-BLADDER, *and* DUCTS.

SYLLABUS.

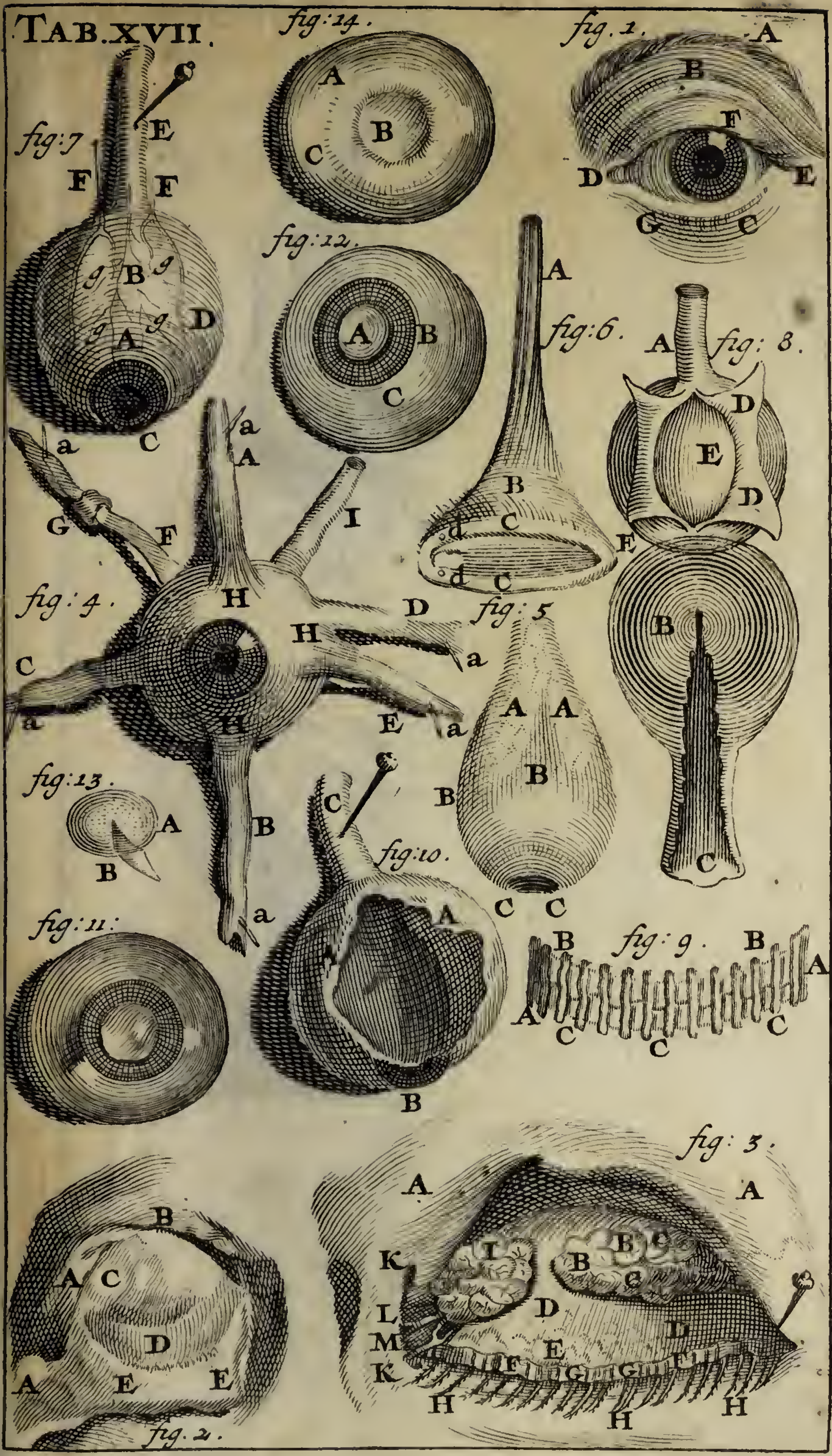
Eorum, quæ quæruntur in

Hepate
- *Superſicies*
  - *Convexa*
  - *Concava*
- *Fiſſuræ*
- *Figura*
- *Magnitudo*
- *Connexio per*
  - *Ligamenta*
  - *Vaſa*
- *Tunicæ*
  - *Communis*
  - *Propria Lobulorum*
  - *Peculiaris Glandularum*
- *Subſtantia*
- *Lobuli*
- *Glandulæ quarum*
  - *Figura*
  - *Ductus Excretorii*
- *Ductus Cyſt-Hepaticus—cujus Inſertio Obliqua*
- *Porus Bilarius cujus*
  - *Capſula*
  - *Truncus*
  - *Orificium*
- *VeſicaFellea cujus-*
  - *Connexio*
  - *Membranæ—*
    - *Communis*
    - *Propria—*
      - *Vaſculoſa*
      - *Muſculoſa*
      - *Glanduloſa*
  - *Fundus*
  - *Collum*
  - *Sphincter*
- *Meatus Cyſticus*
- *Radices Felleæ*
- *Ductus Communis*
- *Vaſa Sanguifera—*
  - *Arteriæ—Hepaticæ*
  - *Venæ—*
    - *Porta*
    - *Cava*
- *Nervi*
- *Lymphæductus*

Liver, *its* Deſcription.

THE LIVER *is a large Glandulous Viſcus, of a red bloodyiſh Colour, ſituated immediately under the* Diaphragm *in the right*

TAB. XVII.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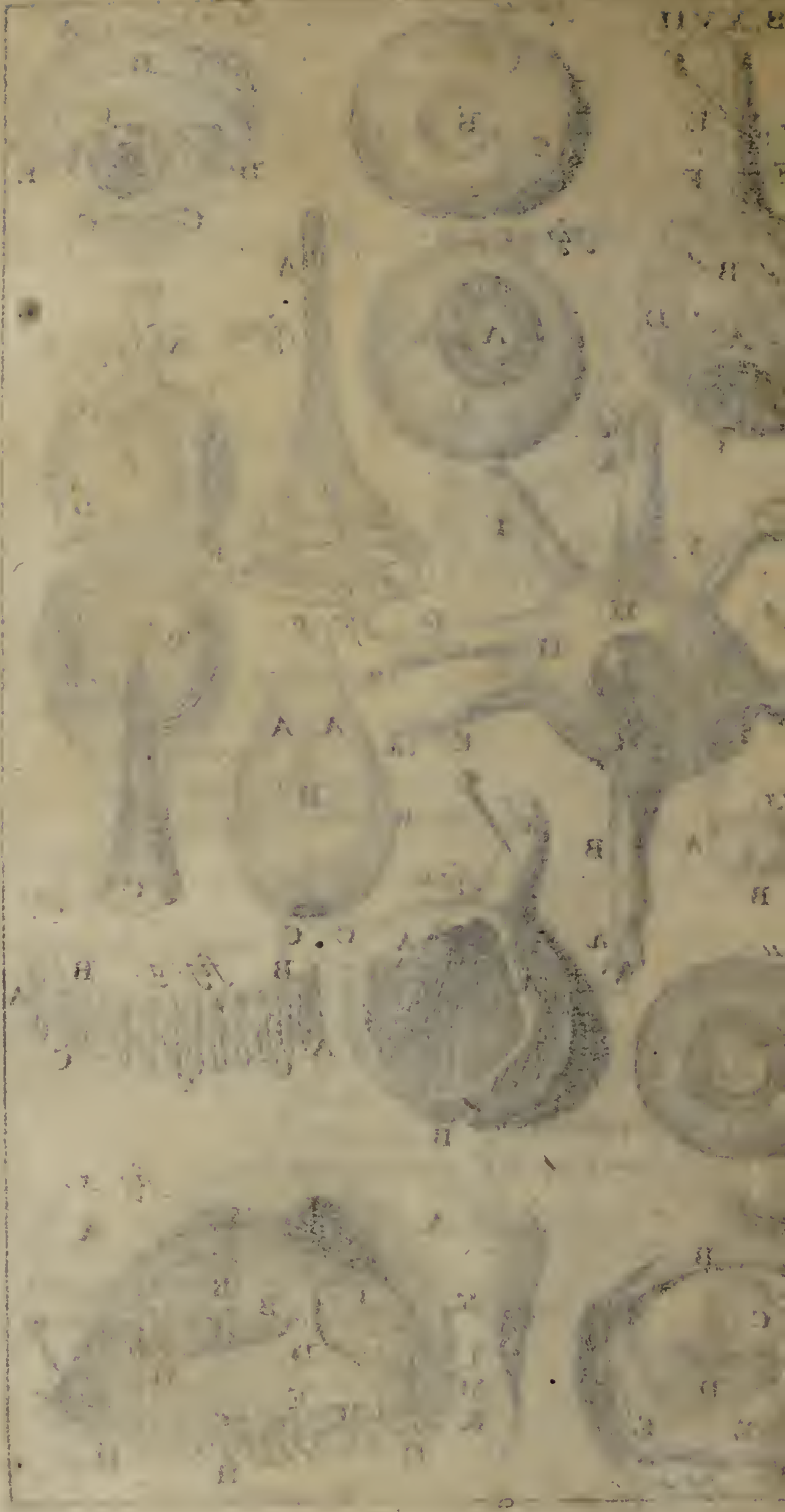
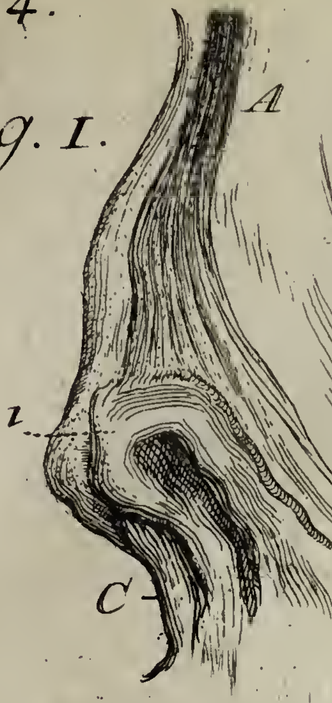


Tab. XVII.

Fig. I.



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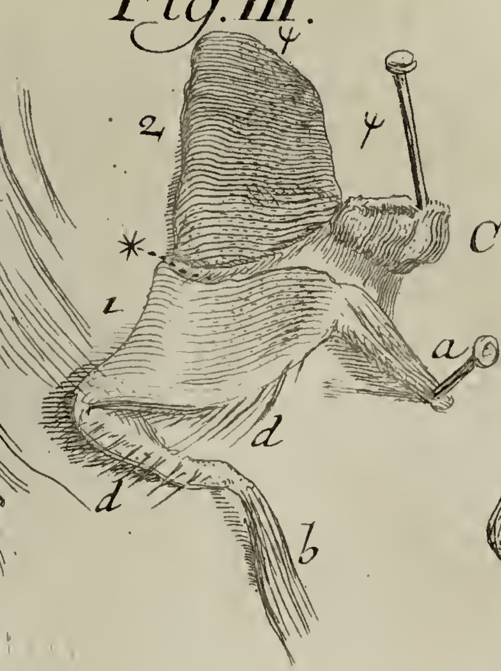


Fig. II.

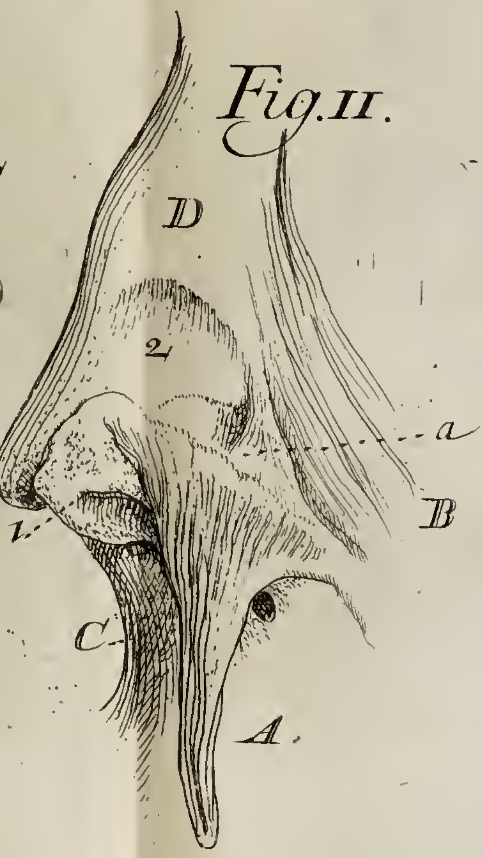


Fig. IV.

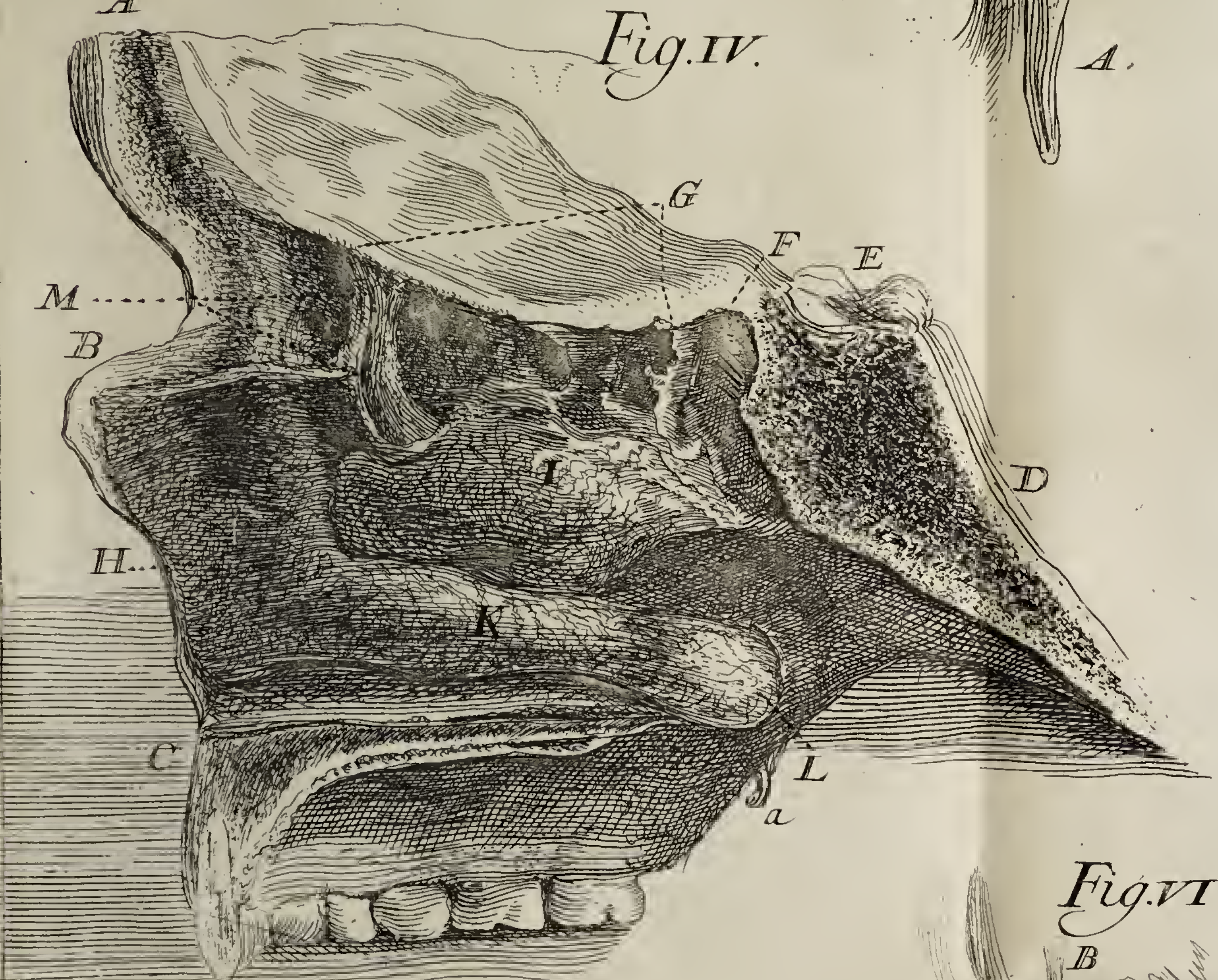


Fig. VI.

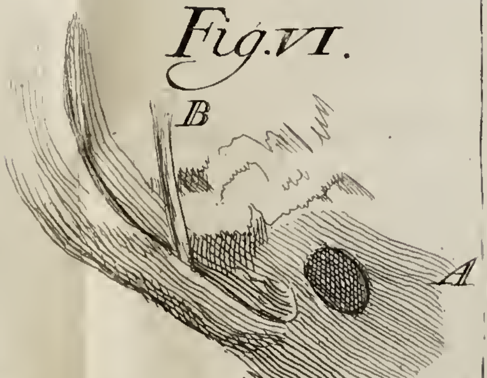
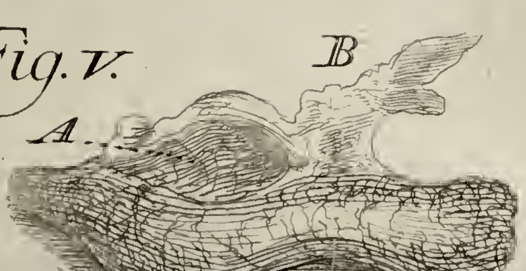


Fig. V.



Tab. II. Fig. I. A. B.

right Hypochondrium, *which it almoſt fills its Situation, and thence ſtretching it ſelf over the right ſide of the* Stomach, *towards the left* Hypochondrium, *reaches beyond the* Cartilago Enſiformis, *growing gradually thinner and narrower.*

Surface Concave, Convex.

The upper part of it is *Convex*, and perfectly ſmooth or poliſh'd: The under *Concave*, and ſomewhat more uneven, having four large *Fiſſures*, one through which the *Umbilical Ligament*, or Rope, paſſes, a Second on the left Side, receiving the *Pylorus*, and the beginning of the *Duodenum*, a Third on the right Side near the Margin, in which the *Gall-Bladder* is lodg'd; and the laſt in the upper part, affording a Paſſage to the *Vena Cava.*

Fiſſures.

Figure.

The *Figure* of it is ſomewhat approaching to round, with thin edges, not altogether even but notch'd in ſome places. Its Magnitude is various in different Subjects, according to the Proportion of the Body, though in a *Fœtus*, or a very young Animal, it is always proportionably much larger than in Adults, in which *Dr. Gliſſon* reckons the ordinary length of it to be equal to that of the *Arm*, from the *Elbow* to the *Wriſt*, meaſuring it by the *Concave* Surface, which is much the ſhorteſt, and differs from the *Convex* about as much as the String does from a Bow moderately bent. The ſame *Author* computes the

Magnitude.

the Breadth to equal the Length of the *Hand.*

In ſome Brutes *di-vided into* Lobes. In *Dogs* and divers other Animals, it is divided into ſeveral diſtinct *Lobes*; but in Men it is generally one continued Body, having one ſmall Protuberance, which is accounted (by many) a little *Lobe.* Yet it has been ſometimes obſerv'd to have been divided into two or three *Lobes.*

Sometimes in Men.

Connexion by the

Ligamen-tum Suſ-penſorium. It is connected to divers Parts, but eſpecially to the *Diaphragm*, to which it is faſtned by a broad, thin, but ſtrong Semi-circular Ligament, call'd its *Suſpenſory* Ligament, and deriv'd, according to *Dr. Gliſſon*, from the common *Capſula* of the *Porta* and *Gall Ducts.* The Continuity of this Ligament, being interrupted by the Perforation of the *Vena Cava*, has given occaſion to ſome Anatomiſts to divide it into two. It is likewiſe by another ſtrong *Ligament*, which has its Origine from the external Coat of the *Liver*, or, which is all one, from the *Peritonæum*, ty'd to the *Cartilago Xyphoides.* And by a third, which is form'd out of the *Umbilical* Veſſels, which in Adults dry up and become a *Ligament*, it is connected to the Tendons of the *Abdominal* Muſcles in the *Linea Alba* at the *Navel.* Theſe ſeveral *Ligaments* ſerve to keep it in its due Situation, beſides which, it has other Connexions by the Blood-Veſſels, which need

Two other Liga-ments.

And the Blood-Veſſels.

need not be mentioned under this Head.

Motion *depending on the* Diaphragm.

The Liver has a Motion, though not proper to it ſelf, but depending on that of the *Diaphragm*, to which being ſo firmly connected, it muſt of neceſſity obey its Motion, and in *Expiration* be drawn up; and in *Inſpiration*, when that is contracted, and approaches towards a Plane, be let down again.

First Tunic *or Common Membrane*

It is cover'd with a thin ſmooth *Membrane*, deriv'd from the *Peritonæum*, which is to be ſeparated from the Subſtance of the Liver, though not without ſome danger of Laceration.

Subſtance.

Its Subſtance is *Vaſcular* and *Glandulous*, which latter part of it is very ſoft and fryable, and pretty eaſily ſcrap'd off from the *Veſſels*, to which the *Glands* every where adhere as it were in Bunches; which has made Anatomiſts call the conſiderable ones the *Internal Lobes* of the *Liver*.

Internal Lobules.

Proper *Membrane conſtituting the* Internal Lobes.

The *Glands* adhering thus to the Veſſels, and conſtituting thoſe *Lobes*, are wrap'd up together in *Proper Membranes*, whence this appearance of diſtinct *Lobes*. Every one of theſe *Glands*, according to the Obſervation of *Malpighius*, is compoſed of ſix unequal Sides or Faces, which are better to be ſeen in *Fiſhes*, and ſome other of thoſe Animals, which are call'd *imperfect*, than in *Men* or *Animals* of a *larger* Kind.

Figure of the Glands.

Theſe

Peculiar Membrane These *Glands* are each of them cloath'd with their proper Membrane, and have each an Excretory Duct, ſeveral of which joyning together, form little Trunks, which run all along with the Branches of the *Porta*, and theſe again uniting, form larger Trunks, which are always found full of *Bile*, and make the *Porus Bilarius*, which being diſtributed all over the *Liver*, receives in the manner foregoing the *Bile*, which is ſeparated by theſe Glands, and terminating in the *Meatus Hepaticus*, and that in the *Ductus Communis*, at length diſcharges the *Bile* into the *Duodenum*.

Excretory Ducts.

Porus Bilarius.

Beſides this diſcharge, which is ſuppos'd to be the great one, it likewiſe delivers part of its *Bile* into the *Gall-Bladder*, by a Duct pretended to be diſcover'd firſt by *Monſieur Perrault*, and by him call'd *Ductus Cyſt-hepaticus*, though long before deſcrib'd by Dr. *Gliſſon*, but in one reſpect defectively, in that he does not take notice of any immediate Communication between the *Porus Bilarius* and the *Gall-Bladder*, by means of that Duct. *Verheyen*, according to the courſe of the *Bile* through that Duct, from the *Porus Bilarius*, reverſes the former Name, and more properly calls it *Hepaticyſticus*, and aſſerts the right of Dr. *Gliſſon* to the Diſcovery, which perhaps the Doctor had otherwiſe loſt, for want of dignifying it

Cyſt-Hepatic *Ducts.*

Firſt deſcrib'd by Dr. Gliſſon.

it with a diſtinct Name; for he barely calls it a *Trunk*.

App. Tab.xxix Fig. 4. C C C. H H H. *Experiment diſcovering the* Cyſt-Hepatic *Duct.*

The way to diſcover this Duct, is to tye the *Meatus Cyſticus*, and then to blow ſtrongly into the *Ductus Communis*, by which means the Air will come round by this Duct into the *Gall-Bladder*, which will be thereby blown up: And if afterwards the *Bladder*, and the *Meatus Cyſticus*, from the Ligature upwards, be laid open, the *Blaſt* will be obſerv'd to penetrate not only into the Bladder, but likewiſe into the *Meatus* it ſelf, by ſeveral little Apertures. This Experiment I have not yet had opportunity to try in a Man, but in an *Ox*-Liver it ſucceeded ſo, as to convince us, that even in an *Ox*, this Duct had not been ſufficiently deſcrib'd.

Obſervations of Verheyen, *concerning this* Duct. Vid. App. Tab.xxix Fig. 2. H. k k. i i i.

Verheyen, in the Proſecution of this Diſcovery, has obſerv'd in the *Gall-Bladder* of an *Ox*, not only *one*, but *three Orifices* opening into it, by blowing into each of which, the *Flatus* penetrated the *Ductus Hepaticus*, and offering to trace them, he found that two of them joyn'd together before they reach'd the *Hepatick* Duct, and enter'd into it with a ſingle Stem and Orifice: The other he obſerv'd to be joyn'd juſt at its Orifice into the *Gall-Bladder* by another Duct, whoſe Roots were diſpers'd through the Subſtance of the Liver. In another Subject the ſame Author ſays, He diſcover'd four *Hepaticyſtick Ducts*, through each of which he blew into the *Gall-Bladder*. In farther Proof of this Diſcovery, he examin'd the *Gall-Bladder* of divers *Oxen*, and never fail'd of finding one or two ſuch Orifices opening into the *Veſicula Fellis*.

Dr. Branthwait's *Experiment and Diſcovery.*

Theſe Obſervations of this Inquiſitive Anatomiſt, are confirm'd by an Experiment which was made before divers of us, by that Ingenious Learned Gentleman *Dr. Branthwait*, (when he prepar'd a Body for his Lecture on this *Viſcus*, in the Theatre of the College, before the whole Society) who by blowing into the *Porus Bilarius*, after having open'd the *Gall-Bladder*, ſhew'd us the Wind iſſuing at a great *many* Orifices, which gives us occaſion to think, that if theſe Ducts were carefully trac'd, they would be found to come from every conſiderable Branch of the *Porus Bilarius*.

One of theſe Ducts *deſcrib'd from* Verheyen.

One of theſe *Ducts* the forementȯn'd curious Author, gives us a Deſcription of, through the whole Tract of it, which, 'till Autopſy ſhall better inform us about the reſt, may ſerve to give us an Idea of them all. It runs from the *Porus Bilarius* to the *Veſicula Fellis*, in length about eight Inches, and is about the thickneſs of a ſmall Straw, but ſomewhat thicker near the *Gall-Bladder*, where it is joyn'd juſt at the Inſertion by another Duct, the Roots of which are diſſeminated through the Subſtance of the Liver.

In its Courſe it receives divers *Tubuli*, or little *Gall-Ducts*, from the *Glands* of the *Liver*, moſt of which are inſerted ſo as to point towards the *Veſicula Fellis*; though ſome about the Extremity neareſt to the *Hepatick Duct*, point towards that, from which Contrivance the Author argues reaſonably enough, that probably when the *Gall-Bladder* is ſo full, as not to admit of any more, they diſcharge themſelves into the *Hepatick Duct*, though their ordinary Courſe be to the *Bladder*: Which is farther confirm'd by the Experiment of Blowing into the *Porus Bilarius*, which eaſily fills the *Gall-Bladder*, though the ſame *Flatus* cannot, by any Compreſſion, be made to return that way to the *Porus Bilarius* again: Yet if the end of a *Blow-Pipe* be put into the *Oriſice* at the *Bladder*, the *Flatus* pierces readily to the *Hepatick Duct*, which ſhews that the ſole Obſtacle is the *Oblique* Inſertion, or *Valves*, of the Mouth of theſe *Ducts*; and that in the Channel, the *Flatus*, and conſequently the *Bile*, moves indifferently either way.

Oblique Inſertion of this Duct.

This *Duct* is inſerted obliquely into the *Veſicula Fellis*, and running a little way between its Membranes, diſcharges it ſelf into it about three Inches above the Neck, after the ſame manner as the *Ureters* do into the *Urinary* Bladder.

Porus Bilarius, *or* Hepatic Duct.

The PORUS BILARIUS, or HEPATICK DUCT, which is the moſt conſiderable of all the *Bilary* Ducts, is form'd after the manner of a *Vein*, from the Concurrence of infinite ſmall Ramifications ſpringing from *Glands*, which united, make up divers Trunks, equal in Magnitude to the Branches of the *Hepatick Arteries*, which accompany them Branch for Branch, through the whole Subſtance of the *Liver*, and are wrapp'd up in the ſame *Capſula* with the *Porta*: Theſe Branches are about the ſize of a Wheat-ſtraw, but the largeſt of theſe are ſometimes ſo ſtretch'd, as to be big enough to admit a Man's little Finger, and are diſtinguiſhable from the Ramifications of the *Porta*, chiefly by their Contents. Beſides the *Capſula* which is common to that and the *Porta*, it has a thick *white Proper Coat*, like the *Muſculous* one of an *Artery*. On the *Concave* ſide of the *Liver*, the ſeveral Ramifications meet and form one Trunk or Channel, which is call'd more peculiarly the *Hepatick* Duct, about the bigneſs of a *Gooſe-Quill*, which deſcending about two Inches, meets with the *Cyſtick* Duct, and together with it, forms that which is call'd the *Ductus Communis*, which deſcending in a right Line about four Inches, farther diſcharges it ſelf into the *Duodenum*, by an oblique Inſertion oftentimes at the ſame Aperture with the *Pancreatick* Duct.

App. Tab. xxix Fig. 2. a a a.

Capacity of its Branches.

Its Trunk.

Its Orifice.

The

The GALL-BLADDER is a *Membranous Receptacle, in Figure ſomewhat like a Pear, ſituated at the lower Margin of the* Liver *on the* Concave *ſide: It is about the bigneſs of a Pullets Egg.* It adheres to the *Liver*, not only by its *Veſſels* which it receives from it, but likewiſe by its *Membranes*, the *External* or *Common* being the ſame with that of the *Liver*, and is a good part of its Subſtance, as it were immers'd in the *Liver*: The lower part which hangs out of the *Liver*, reſts upon the *Pylorus* of the *Stomach* or *Colon*, which it dyes Yellow by thoſe parts of *Gall* which tranſude through its *Membranes*.

Gall-Bladder. App. Tab. xxix Fig. 4. E A. *Its Connexion.*

Its *Membranes* are reckon'd five, an outer or common one from the *Peritonæum*, an inner one on that ſide which adheres to the *Liver* from the *Capſula* of the *Porta*, and of the *Porus Bilarius*, beſides three Proper.

Membranes.

The *Exterior* of the *Proper* Membranes, conſiſts of a great Number of white *Fibres*, irregularly interwoven with a great Number of Veſſels, upon the account of which it is call'd the VASCULOUS Coat.

Exterior, or Vaſculous.

The *Second* conſiſts of a ſort of Fleſhy *Fibres* of a double Order, and therefore it is call'd the MUSCULAR Coat. The firſt Order of theſe *Fibres* is *Longitudinal*, but ſomewhat irregularly diſpoſed: The Second are *Annular*, but alike irregular with the

Second Muſcular

former, often interſecting one another, as the former do, at very acute Angles.

Third or Inner Glandulous. The *Third* or *Inner* Coat, which is very much wrinkled, conſiſts of a great Number of *Glands*, like the *Cruſta Villoſa* of the *Stomach*, and is therefore properly call'd its *Glandulous Coat:* It ſeparates a *Mucus*, which, lining all the inſide of this *Bladder*, ſerves to defend it from the extream Acrimony of the *Bile*, which is in this part abundantly thinner, and much more Acrimonious, than in the *Porus Bilarius.*

Thus the *Tunics* of the *Gall-Bladder* are deſcrib'd by ſome, who are Nice in diſtinguiſhing Membranes. But to us, aſſiſted by the Microſcope upon a piece of a *Gall*-Bladder dry'd, the reaſon of this accurate Diſtinction did not appear. Vide Tab. II. Fig. II. But on the other hand, theſe ſeveral Orders of *Fibres*, before deſcrib'd, ſeem'd to be only an infinite Perplexity of Veſſels diverſly ramify'd, with ſome *Fibres*, perhaps diſorderly mix'd, which when the Subject is dry, are not eaſily to be diſtinguiſh'd.

Fundus. Collum. Sphincter. The *Bladder* has been divided into two parts, the *Fundus* or *Bottom*, and the *Collum* or *Neck*. At the Orifice of which latter is placed a *Ring*, or *Circle*, of pretty ſtrong *Muſcular* Fibres, which ſerve as a *Sphincter* to conſtringe the Orifice of the *Gall-Bladder*, and hinder the too liberal diſcharge of the *Bile*.

Meatus Cyſticus. App. Tab.xxix Fig. 4. G G.

Juſt below theſe *Fibres*, which by ſome have been miſtaken for a *Valve*, is continu'd another *Bilary* Duct, call'd *Meatus Cyſticus*, which is about the bigneſs of a Gooſe-Quill, and at about two Inches diſtance from the *Gall-Bladder* is joyn'd to the *Meatus Hepaticus*, which together form the *Ductus Communis* before mention'd.

Vena Porta *contrary to all other* Veins, *ſhoots from a* Trunk *into* Branches *like an* Artery Ibid. Fig.2. B. c c c. Fig. 4. I.

Beſides theſe *Gall*-Veſſels, which are peculiar to the *Liver*, it abounds with *Blood*-Veſſels, eſpecially *Veins*, of which the *Porta* and *Cava* are diſſeminated through the whole Subſtance of it: And here it is particularly remarkable of the *Porta*, that after the manner of *Arteries*, it ſhoots it ſelf from a *Trunk* into *Branches*, and being at laſt loſt in *Capillaries*, it delivers the Blood into the *Cava*, by which it is immediately re-convey'd to the *Heart*.

Trunk *of the* Porta *but ſhort.*

The *Porta* is form'd out of the Concurrence of divers *Veins*, which meeting together make one of the moſt conſiderable *Venous Trunks* of the Body, as to its Bulk, though contrary to the Courſe of other Veins, it runs not far in a *Trunk*, but is, as before obſerv'd, ſoon diſtributed again, by Ramifications, into the *Liver*.

Vulgar Diviſion of the Porta, *why not follow'd.*

According to the vulgar Method, we might divide this *Vein* into Branches *without* the *Liver*, and Branches *within*, and a *Trunk* intermediate. But being of Opinion, that this Method is not ſo clear as it ought

Branches *without the* Liver, *not properly ſo call'd.*

to be, and the *Branches*, as they are call'd, *without* the *Liver*, are not ſo properly *Branches* as *Roots*, which have, by Anatomiſts, been dignify'd with diſtinct Names, from the Parts from whence they come. We ſhall not amuſe the Reader with it, but proceed to enumerate thoſe *Veins*, which conſpire towards the Formation of this *Trunk*, which having been deſcrib'd in their proper Places, or being to be deſcrib'd there, we ſhall not enlarge upon their Deſcriptions here, but content our ſelves only to name them, with a ſhort Hint from whence they come.

Veins *concurring to form the* Trunk *of the* Porta.

Theſe are from the *Placenta Uterina*, in a *Fœtus* the *Vena Umbilicalis*, from the *Gall-Bladder* the *Cyſticæ Gemellæ*, from the *upper* part of the *Stomach* the *Pylorica*, or *Gaſtrica dextra*, which goes to the *Trunk*: The *Gaſtrica Major*, and *Minor Siniſtræ* from the *Stomach*, (of which the Major is form'd out of the *Coronaria Ventriculi*) the *Epiplois Siniſtra*, and *Poſtica* from the *Omentum*, the *Gaſtroepiplois* from the *Stomach* and *Omentum*, the *Vas*, or *Vaſa Brevia*, from the *Stomach*; the *Splenica* from the *Spleen*, all joyn to form the *Left* or *Splenick Branch* of the *Porta*. The Right, call'd alſo the *Meſenterick* Branch, conſiſts of the *Gaſtrica* and *Epiploica dextra*, from the *Stomach* and *Omentum*, the *Duodena* from the *Duodenum* and *Jejunum*; the *Hæmorrhoidalis Interna*, from the *Inteſtinum Rectum* and *Colon*; the *Meſaraicks* from the *Meſentery*: By means of all which recited Veſſels, the *Porta* receives the Blood from moſt of the *Viſcera* of the *Abdomen*, and, after the Coaleſcence of its Branches, enters the *Liver* in a *Trunk*, immediately under the Surface whereof, having firſt form'd a kind of *Sinus*, it is divided in two principal Branches, and thoſe again into five, which ſcatter innumerable Ramifications through the whole Subſtance of the *Liver*. The ſeveral larger Branches, are together with the Branches of the *Porus Bilarius*, wrapp'd up in a common *Capſula*, or Membrane already deſcrib'd.

Branches *of the* Cava *in the* Liver, *improperly ſo call'd.*

The *Blood* which is convey'd into the *Liver* by the *Porta*, after the manner of the *Artery*, is receiv'd again, after having been purg'd of its Bile in the *Glands* of the *Liver*, into innumerable *Veins*, which empty themſelves into the *Cava*, and are vulgarly, though improperly, call'd *Branches* of the *Cava*, but ought indeed to be eſteem'd the proper Blood-Veſſels of the *Liver*, as the *Emulgents* are of the *Kidnies*, and which do as all others, except the *Pulmonary Vein*, exonerate themſelves into the *Cava*, the common Channel by which the Blood returns to the *Heart*.

Hepatic Arteries. App. Tab.xxix Fig. 1. I. L.

The *Arteries* which are call'd the *Hepatic*, come from the Right Branch of the *Cæliack*. The Learned *Dr. Gliſſon* thinks, that the *Porta* does ſo much the Office of an *Artery*, that no more are neceſſary than *thoſe only which Miniſter Nouriſhment to the Membranes and Capſula*: Though I cannot but think that they ſerve for the Nouriſhment of the whole Part, and perhaps for other Uſes.

General Miſtake of Anatomiſts *concerning theſe* Arteries.

Anatomiſts, having generally form'd their Idea's of the *Hepatic Arteries*, from the Diſſection of the *Livers* of *Quadrupeds*, (eſpecially *Horſes* and *Oxen*) have repreſented them much leſs, than really they are in *Human* Bodies, becauſe they have found them ſo in thoſe Subjects, and have concluded them proportionally leſs in *Human*; whereas they are in Fact much bigger, as appears by ſeveral Preparations, which are to be ſeen at Mr. *Cowper*'s, in which the Stem of each *Hepatic Artery* is as large as a Gooſe-Quill, and the Branches in the *Liver* are every where equal in Magnitude to thoſe of the *Porus Bilarius*, which they accompany. Perhaps in *Human* Bodies in this *Viſcus* a larger *Stream*, and directer *Impetus* of *Arterious* Blood is requir'd to drive on the *Venous*, becauſe of the *Erect* Poſture then in Animals of a *Horizontal* Poſition of Body. For which reaſon *Horſes*, &c.

Why larger in Human *Bodies, than in* Horſes, *and greater* Animals.

&c. though of much larger Size, and having much bigger *Livers*, have theſe *Arteries* much ſmaller than *Men*, and not only ſo, but curl'd like the Tendrels of a Vine, to break the *Impetus*, which in that Poſture is not ſo neceſſary as in the Erect.

Deſideratum *in* Anatomy

Theſe ſorts of Differences in the Mechaniſm of *Animals*, upon the Score of the Poſition of their Bodies, occur ſo often, that it would be no mean Service to *Anatomy*, and the *Oeconomical* Hiſtory of *Animals*, if any one, who had Opportunity, and Ability, would give us a Hiſtory of thoſe Variations of the Parts of *Animals*, which ſpring from the different Poſtures of their Bodies.

Nerves.

The *Nerves* come from the *Plexus*, call'd by Dr. *Willis* the *Hepatick Plexus*, form'd on the right *Hypochondrium* by the Branches of the *Intercoſtal*, which wrapping themſelves about the *Arteries*, make a ſort of a Net-work, and after ſpreading themſelves upon the Membrane and Surface diſappear.

Lymphæducts.
App. Tab. xxix Fig. 1.
Q Q.
R R.

The *Lymphæducts* are numerous, but not eaſily obſerv'd in a *Human* Subject, for want of Live Diſſections, or at leaſt whilſt the Subject is warm; but in other Animals, which may be diſſected alive, if a Ligature be laid upon the *Porta* and the *Bilary Ducts*, they become very conſpicuous. But, by blowing into the *Arteries* or *Gall-Ducts*, they may be made viſible, and appear very numerous on the *Concave* Surface of the *Liver*, where they Ibid. P run to a *Lymphatick Gland*, from which the *Exporting Lymphæducts* ariſe, and empty themſelves into the *Receptaculum Chyli.*

CHAP.

TAB. XVIII.

fig: 2.

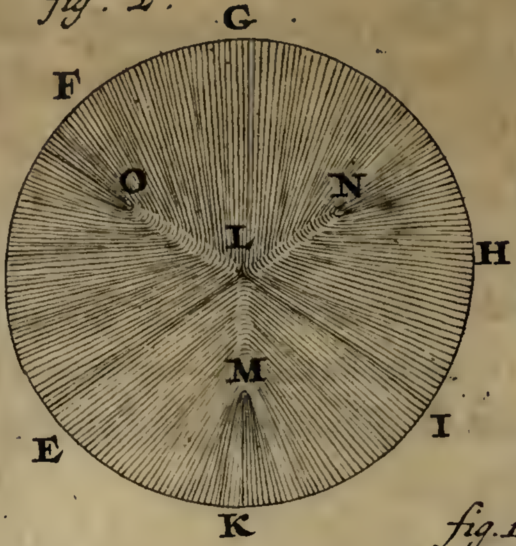


fig. 3.

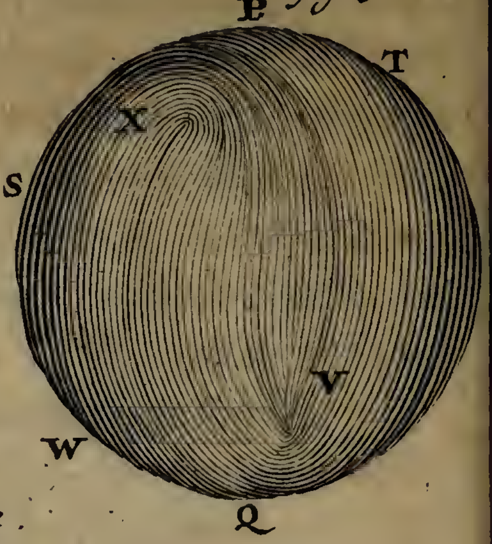
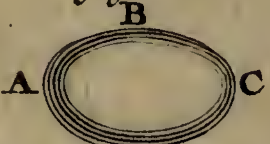


fig. 1.



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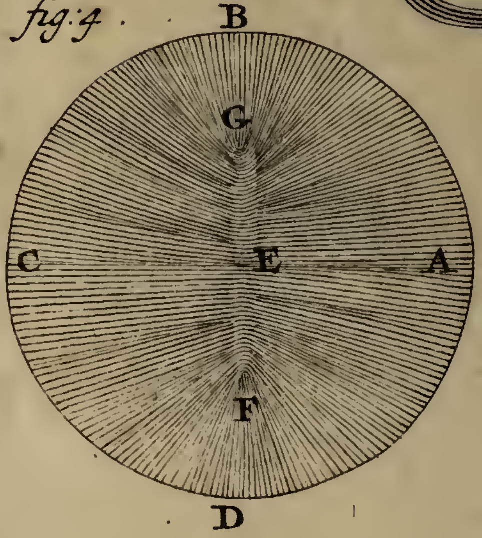

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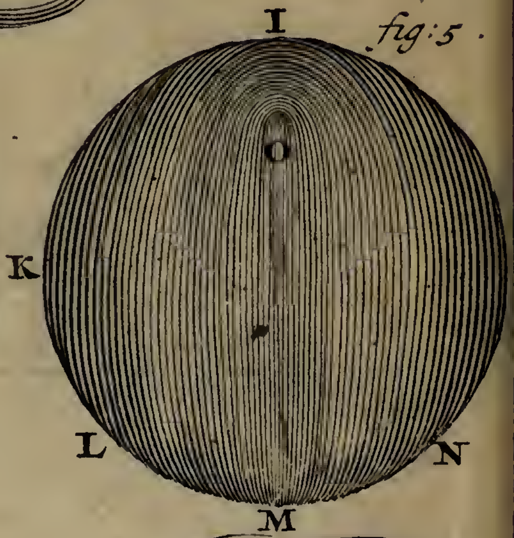


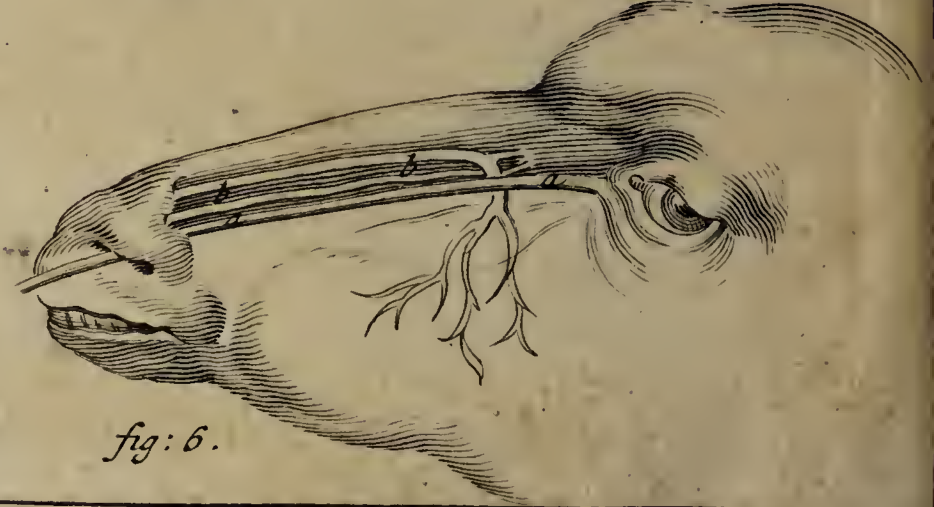


fig: 6.

Fig. II.

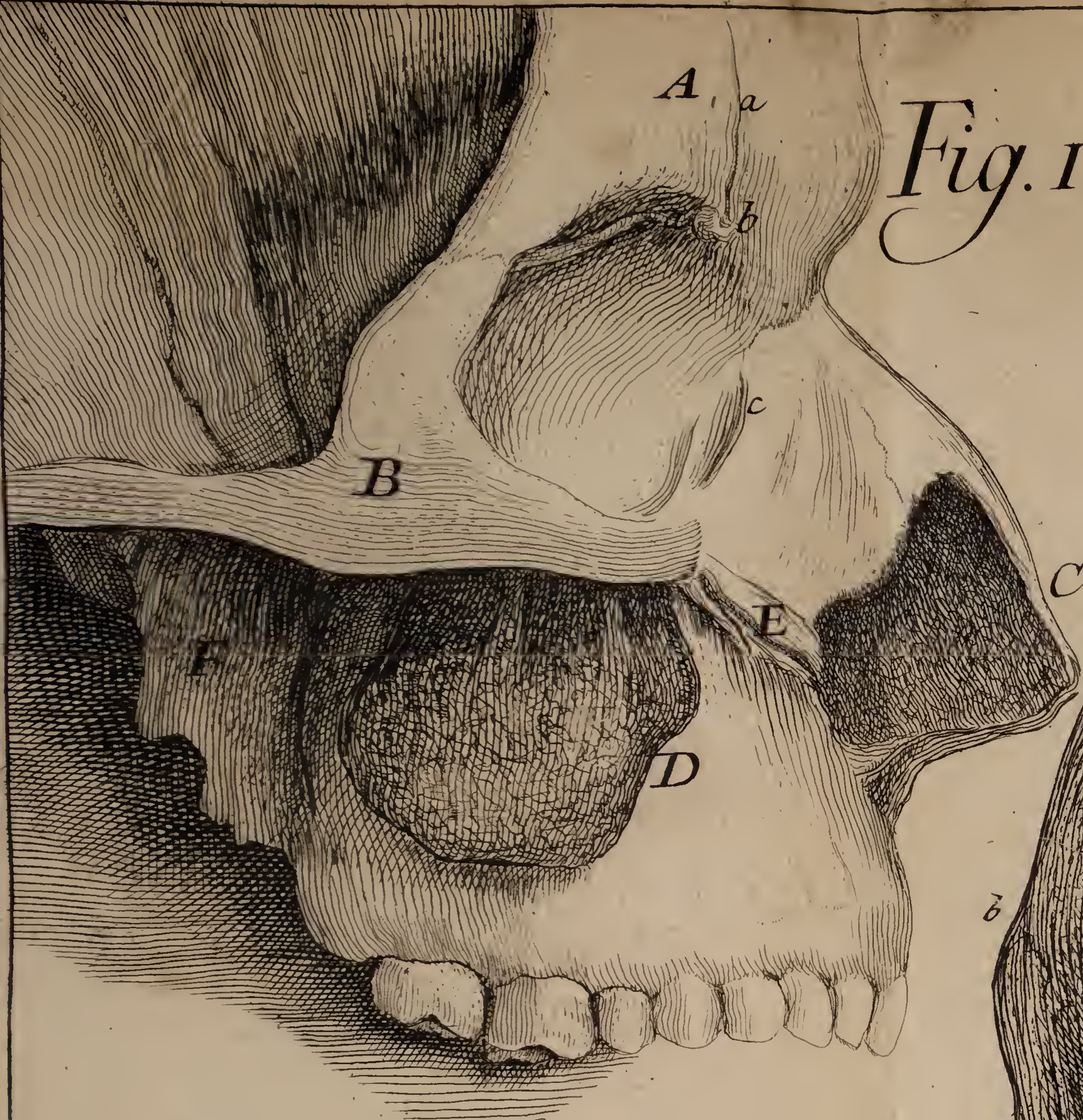


Fig. I.

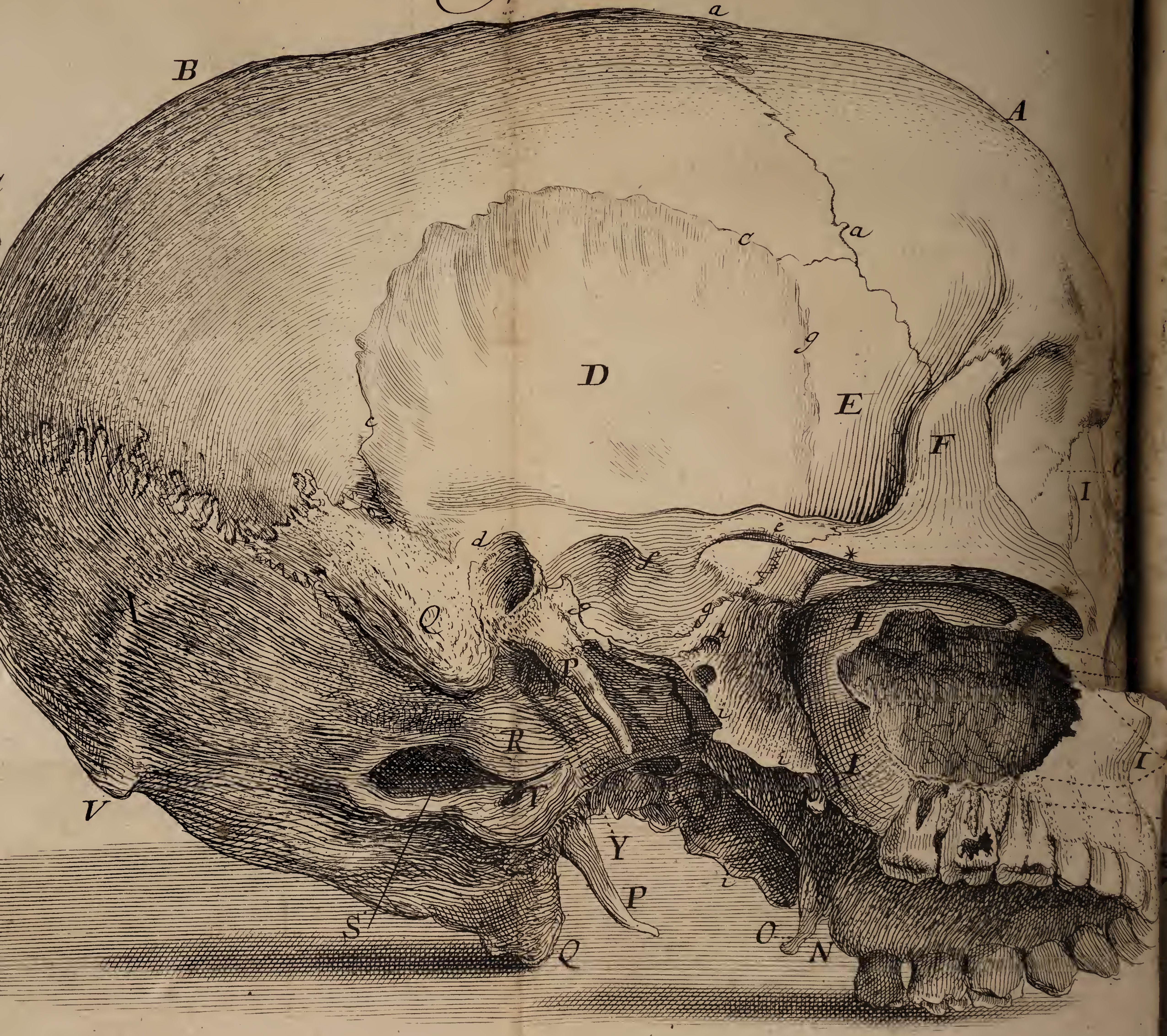
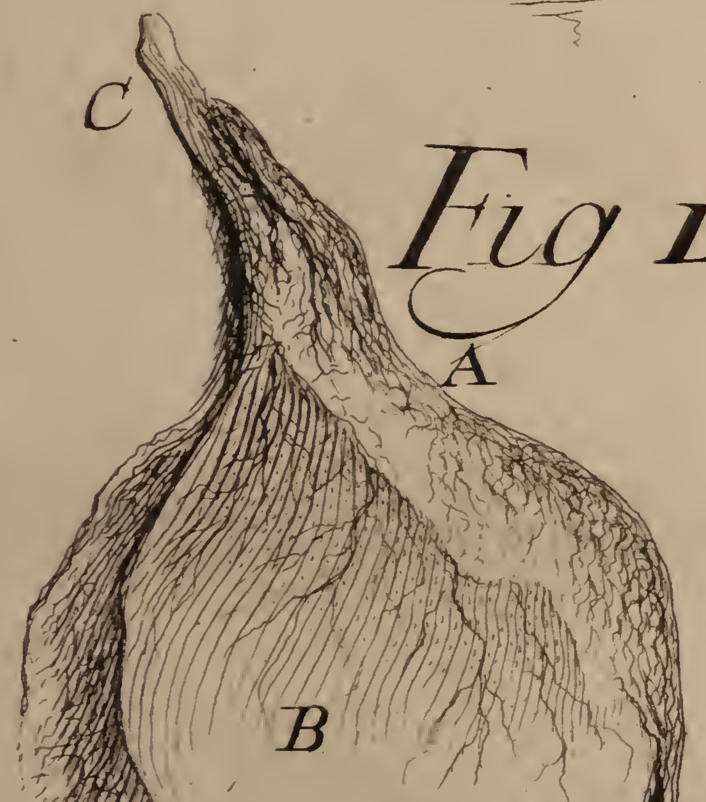


Fig III



CHAP. XVIII.

Of the KIDNIES, *and* Glandulæ Renales.

SYLLABUS.

Spectatu Dignorum in

- *Renibus*
  - *Situs utrinque*
  - *Figura*
  - *Magnitudo*
  - *Tunicæ*
    - *Exterior Adipoſa*
    - *Interior*
  - *Connexio*
  - *Subſtantia*
    - *Exterior rubra Stellata*
    - *Interior alba Tubuloſa*
  - *Vaſa*
    - *Arteriæ*
      - *Emulgentes*
      - *Adipoſæ*
    - *Venæ* —— *Cognomines*
    - *Nervi*
    - *Lymphæductus*
  - *Papillæ*
  - *Tubuli Urinarii*
  - *Pelvis*
  - *Ureteres*
    - *Ortus*
    - *Situs*
    - *Membranæ*

Append.
Tab.xxx.
& xxxi.

Glandulæ Renales quorum--Magnitudo in
- *Fœtu*
- *Adultis*

THE KIDNIES are ſituated on each ſide, the Right between the *Liver*, and *Muſculus Lumbaris* on the right ſide: The Left between the *Spleen* and the ſame Muſcle

Vide
Tab. II.
Fig.I. i i
Kidnies.
Situation on each ſide.

Muſcle on that ſide, only the *Right* is ſomewhat lower in Men than the Left: Though in *Brutes* it is generally the contrary. Figure. It is in *Figure* pretty like a *Bean*, but not quite ſo flat. They are in Men Magnitude. commonly about five Inches long, and three broad, and about one and an half thick.

Exterior or Adipoſe *Membrane.* They lye between the Duplicature of the *Peritonæum*, which affords them their *Exterior* Membrane, which in Perſons not emaciated, generally abounds with *Fat*; whence it has by ſome been call'd *Tunica Adipoſa.* This Membrane envelops them but looſely, and in *Fat* Perſons is ſwell'd by the *Fat* to a very conſiderable thickneſs; but not ſo much as in *Quadrupeds*, becauſe the *Horizontal* Poſition of their Bodies, leaves a greater ſpace between their *Inteſtines*, and theſe Parts in which their *Fat* abounds.

Interior Membrane. The *Interior* Membrane ariſes from the *Exterior* of the *Blood*-Veſſels, and adheres pretty cloſely, yet not ſo as not to be eaſily ſeparable.

Connexion By their external Membrane, they are connected to the *Loins* by their *Blood*-Veſſels to the *Aorta* and *Cava*, and by the *Ureters* to the *Bladder* of *Urine*: The *Right* is likewiſe ſometimes connected to the *Inteſtinum Cæcum*, and ſometimes to the *Liver*; the *Left* to the *Colon* and *Spleen*.

Exterior Subſtance

The *Subſtance* of them is made up of *Glands* and *Veſſels* of ſeveral kinds, the *Exterior* part of which, carries a very different Face from the *Interior:* The *Exterior* conſiſting moſtly of *Glands*, and very fine Ramifications of the *Blood*-Veſſels, which latter ſhooting their Branches round, like Lines drawn from a Centre, form divers little elegant Star-like Figures, which cutting the Kidney longitudinally, ſhew themſelves very readily. This part of the *Subſtance* is in colour reddiſh, and is about a third part of the depth of the *Kidney.*

Interior.

Papillæ.

App. Tab.xxxi Fig. 2.

Next within theſe, appear a Number of ſmall *Urinary* Veſſels, which look like pale fleſhy Fibres, which joyning together, make the *Carunculæ Papillares*, which are only a Bundle or Collection of theſe little *Urinary Pipes*, and theſe again end in ſhort *Tubulous Bodies*, or *larger* Pipes, anſwering to the Number of the *Papillæ*, which are uſually twelve, and are call'd *Fiſtulæ Membranaceæ*, being only Productions of the Membraneous Cell, call'd, the *Pelvis*, which is a Cavity in the Concave part of the *Kidney*, poſſeſs'd by a Dilatation of the *Ureter.*

Sinus *or* Pelvis.

Ureters.

Tab. II. Fig. I. q q q

The *Ureters* are long round *Membranaceous Pipes*, protended from the *Kidnies* to the *Bladder*, for the conveyance of the *Urine.*

Their Courſe and Inſertion.

They run with an Inflexion ſomewhat reſembling the Letter *S*, and are obliquely inſerted into the *Bladder* near the *Neck*, after having run ſome ſpace betwixt the *Membranes*.

Their Magnitude. They are ordinarily about the bigneſs of a *Ducks Quill*, though in *Calculous* Caſes they are ſometimes diſtended to a much greater Size.

Blood-Veſſels. They receive *Arteries* from, and return *Veins* to the Trunks of the *Aorta* and *Cava*, and *Nerves* from the *Intercoſtals*, and from the *Medulla Lumbaris*, by means of which, they are rendred extreamly ſenſile, and though diſtendable, as we have ſaid, to a vaſt degree, yet not without exceſſive Pain.

Emulgents Tab. II. Fig. I. h. The *Kidnies* have *Arteries* and *Veins*, which are call'd by one common Name *Emulgents*, and are uſually but one of a ſort to each Kidney, though they have been obſerv'd ſometimes to vary in their Number. *Their Diſtribution in the* Kidnies. The *Emulgent Arteries* ſpring from the *Aorta* by a ſingle Root, but uſually at the entrance into the *Kidnies*, divide themſelves into two Branches, and thoſe again into divers others, the ſeveral Ramifications of which, are diſtributed into all the *Glands*, which make the Cortical part of the *Kidnies*, and which in *young Children*, and ſome *Brutes*, eſpecially in *Hogs*, are congregated into Bunches like diſtinct *Lobes*, as thoſe in the *Lungs* are, which inequality is viſible on the Surface, but diſappears by Age and Time, which level and render them ſmooth in *Men*.

Secretion of Urine.

From the Blood convey'd by theſe *Arteries*, the *Urine* is ſeparated by the *Glands* into the *Ducts*, or *Papillæ*, and *Fiſtulæ Membranaceæ* before mention'd, and thence through the *Pelvis* and *Ureters* into the *Bladder*. After the *Secretion* of *Urine*, the Blood is return'd by the *Emulgent Veins* to the *Cava*.

Adipoſe *Artery and Vein.*

Beſides theſe Blood-Veſſels, there is a Peculiar Artery and Vein which ſerve the Exterior Membrane of the *Kidnies*, and are by a diſtinct Name call'd, the *Adipoſe Artery, and Vein.*

Nerves.

The *Nerves* of the *Kidnies* come from the *Plexus* of each ſide, call'd the *Plexus Renalis*, which is form'd out of the Branches of the *Intercoſtal*, and *Medulla Spinalis*. The Twigs of which twine pretty thick about the *Emulgents*, eſpecially the *Artery*.

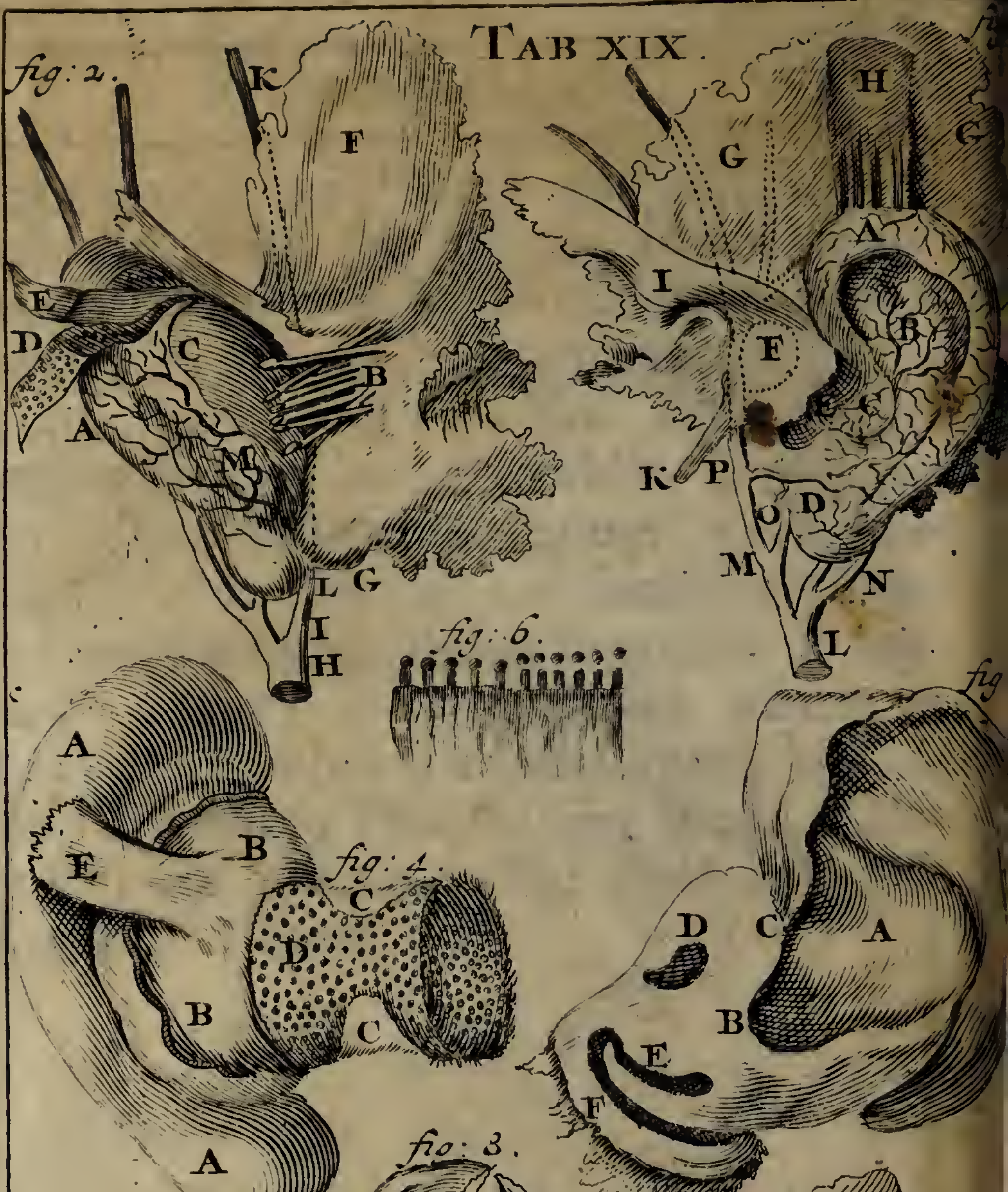
Lymphaticks.

There are *Lymphaticks* belonging to the *Kidnies*, which in *Brutes* are obſerv'd to exonerate themſelves into *Pecquets Receptacle*, but *Humane* Subjects are examin'd too long after Death, for them to appear ſo plain, yet if you blow into the *Arteries*, *Veins*, or *Ureter*, the reſt being tyed, you'll ſee the *Lymphæducts* diſtended.

Glandulæ Renales, or Renes Succenturiati.

Between the Trunks of the *Aorta* and *Cava*, and the *Kidnies* a little above the *Emulgents*, are ſituated two *Glands* of an irregular uncertain Figure, call'd, *Glandulæ Renales*, *Capſulæ Atrabilariæ*, *Renes Succenturiati*, which in a *Fœtus* almoſt equal the *Kidnies* themſelves in Magnitude, but gradually ſhrink, till in *Adult* Perſons they come to be very inconſiderable. They have their *Blood*-Veſſels ſometimes from the Neighbouring Trunks, and ſometimes from the *Emulgents* and *Nerves* from the *Plexus Renalis*. They have a Cavity which is uſually fill'd with a blackiſh Liquor, but no proper Excretory Duct having been yet diſcover'd, we remain in the Dark as to the uſe of theſe *Glands*. *Veſſels.*

TAB XIX.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CHAP. XIX.

Of the URINARY BLADDER *and* URETHRA.

SYLLABUS.

Eorum quæ conſpiciuntur circa

Veſicam Vrinariam
- *Situs*
- *Figura*
- *Tunicæ*
  - *Communis ſeu Membranoſa*
  - *Media ſeu Muſculoſa*
  - *Interior ſeu Nervea, & Glanduloſa*
- *Connexio*
- *Inſertio Vreterum*
- *Vaſa*
  - *Arteriæ*
  - *Venæ*
  - *Nervi*
- *Sphincter*
- *Vrethra.*

THE URINARY BLADDER, the Receptacle of Urine, is ſituated in the *Pelvis* of the *Abdomen* in *Men*, immediately upon the *Inteſtinum Rectum*; in Women, upon the *Vagina Vteri*, which lyes betwixt them. Its Figure in *Quadrupeds*, reſembles a Pear with the Baſis upwards, but in *Human* Bodies the lower part is almoſt upon the Level with the upper, and its Orifice, or *Neck*, lyes ſide-ways, while the *Fundus*, or Bottom, (as it is call'd) which in a *Hu-*

Vide Tab. II. Fig. I. r.

Fundus, *or broad part.*

man Bladder is very broad, reſts upon the *Rectum*, or *Vagina Uteri.*

Membranes or Coats. It conſiſts of three *Membranes*, the *outward* of which, or *Common* Membrane, is deriv'd from the *Peritonæum*: The *Middle* one, which is call'd the *Muſculous* Coat, is compos'd of fleſhy Fibres running longitudinally, which are interſected by others, irregularly diſpos'd a-croſs them. The *Third* is ſaid to be *Nervous*, and has a great number of *Glands* under it, which ſeparate a *Mucous* Matter, to defend it from the Acrimony of the *Urine*, which otherwiſe might offend it, being extreamly ſenſile. Tab. III. h.

It is capable of being extended to a great degree, and conſequently the External Dimenſions of it are lyable to great Alterations.

Connexion. It is ty'd to the *Peritonæum* and *Navel* by the *Urachus*, which, after Birth, ſerves only as a *Ligament*. The *Neck* of it in Men, adheres firmly to the *Rectum*, and in Women to the *Vagina Uteri*, and before to the *Oſſa Pubis*, by means of the *Peritonæum*.

Perforations *for the* Ureters. It is pierced by the *Ureters*, two or three Inches above the *Neck*, which as we have already obſerv'd, are very obliquely inſerted, to hinder the return of the *Urine*.

Sphincter At the *Exit* of the *Bladder*, to prevent the perpetual Dripping of *Urine*, is plac'd a *Muſcle*, conſiſting of *Circular* Fibres, which is call'd the *Sphincter Veſicæ*. This Muſcle keeps the *Bladder* conſtantly ſhut, and is only open'd when, by the Contraction of the *Abdominal* Muſcles, the *Bladder* is compreſs'd, and the *Urine* forc'd out.

Urethra.

Adjoyning to the *Neck* of the *Bladder* is the *Urethra*, which is the Excretory Pipe, or Tube, for the *Urine* to paſs through; which is much ſhorter in *Women* than in *Men*, and much wider, and capable of greater Diſtention, as the Operation of Extracting *Stones* by *Dilatation* proves.

Veſſels.

Nerves.

The *Bladder* and *Urethra* have *Veins* and *Arteries* from the *Epigaſtricks* and *Iliacks*, and in Women from the *Spermaticks* likewiſe, and *Nerves* from two *Plexus* in the *Pelvis* of the *Abdomen*, form'd out of Branches of the *Par Vagum*, and the *Nerves* of the *Os Sacrum* united.

There are three pretty notable *Glands*, diſcover'd not long ſince by Mr. *Cowper*, whoſe *Excretory* Ducts terminate in the *Urethra*, and which are ſituate not far behind its Membrane. But theſe relating, in their Uſe, rather to the Parts of *Generation*, than to the Urinary, they ſhall be deſcrib'd with the *Penis*.

CHAP. XX.

Of the Parts of Generation *proper to Men.*

Vide App.Tab. xxxii & xxxiii.

Under this Head of the GENITAL Parts of *Men*, are included, as Principal of this Chapter, *The* SPERMATICK *Veſſels*, *The* TESTICLES, *The* PARASTATÆ, *The* VASA DEFERENTIA, *The* VESICULÆ SEMINALES, *The* PROSTATES, and *The* SCROTUM.

SYLLABUS.

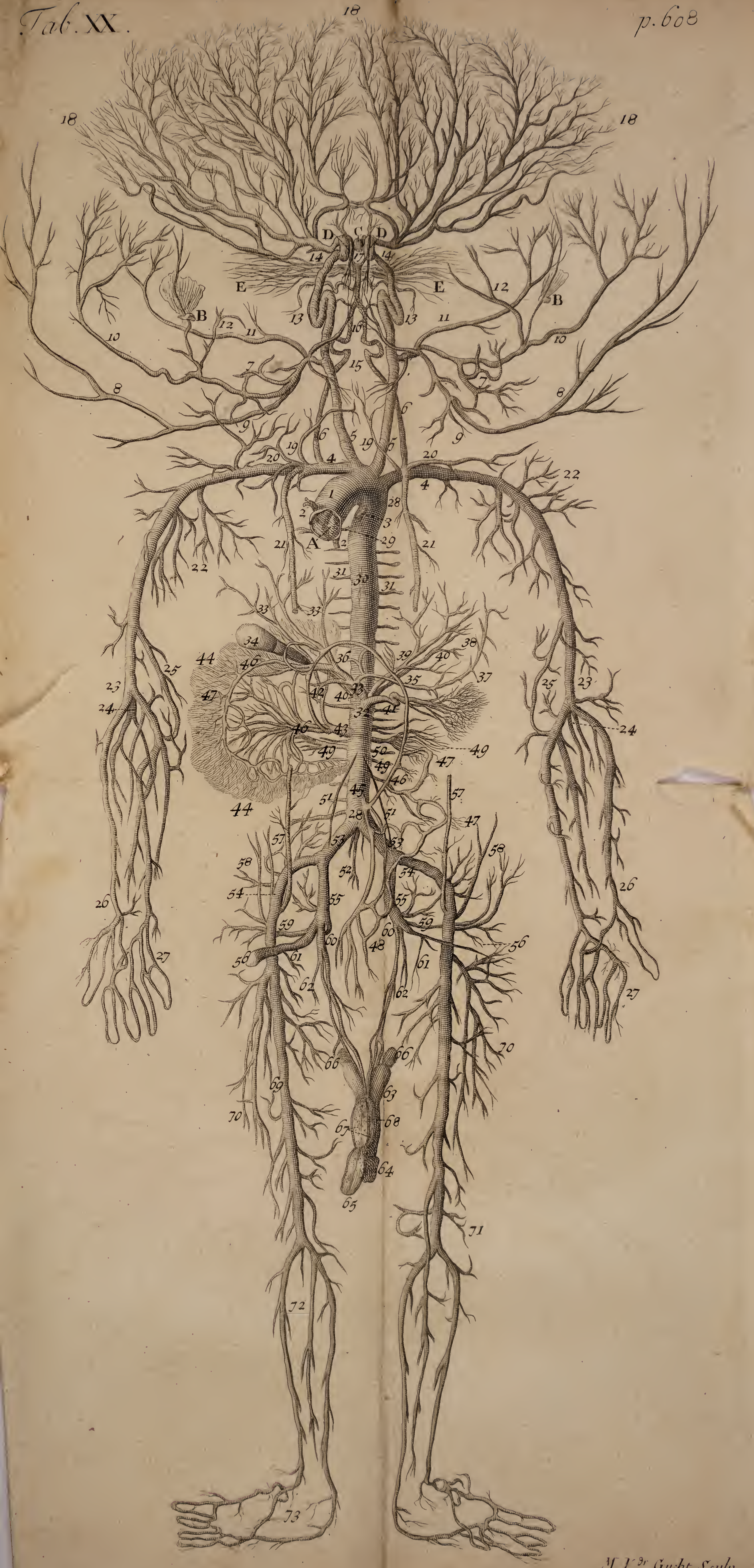
Maxime Notabilium circa

Genitalia Virilia
- *Vaſa Præparantia*
  - *Arteriæ Spermaticæ*
    - *Strictura ad Originem*
    - *Tortuoſitas in Brutis*
  - *Venæ Spermaticæ*
    - *Corpus Varicoſum*
    - *Valvulæ*
  - *Nervi*
- *Teſticuli*
  - *Situs*
  - *Tunicæ*
    - *Muſculoſa à Cremaſtere*
    - *Elytroides ſeu Vaginalis*
    - *Albuginea*
  - *Cremaſteres*
  - *Subſtantia*
  - *Epididymidæ*
  - *Vaſa Deferentia*
- *Veſiculæ Seminales*
  - *Numerus*
  - *Subſtantia Membranacea*
  - *Situs*
  - *Cellulæ*
  - *Glandulæ*
  - *Septum*
  - *Carunculæ*
  - *Semen*
- *Proſtatæ*
  - *Situs*
  - *Numerus*
  - *Subſtantia*
  - *Ductus Excretorii*
  - *Carunculæ*
- *Scrotum*
  - *Membranæ*
    - *Communis à Cute*
    - *Dartos à Panniculo Carnoſo*
  - *Sutura*
  - *Septum*
  - *Uſus*

THE

Tab. XX.

p. 608



M. V.dr Gucht Sculp.

TAB. XX.

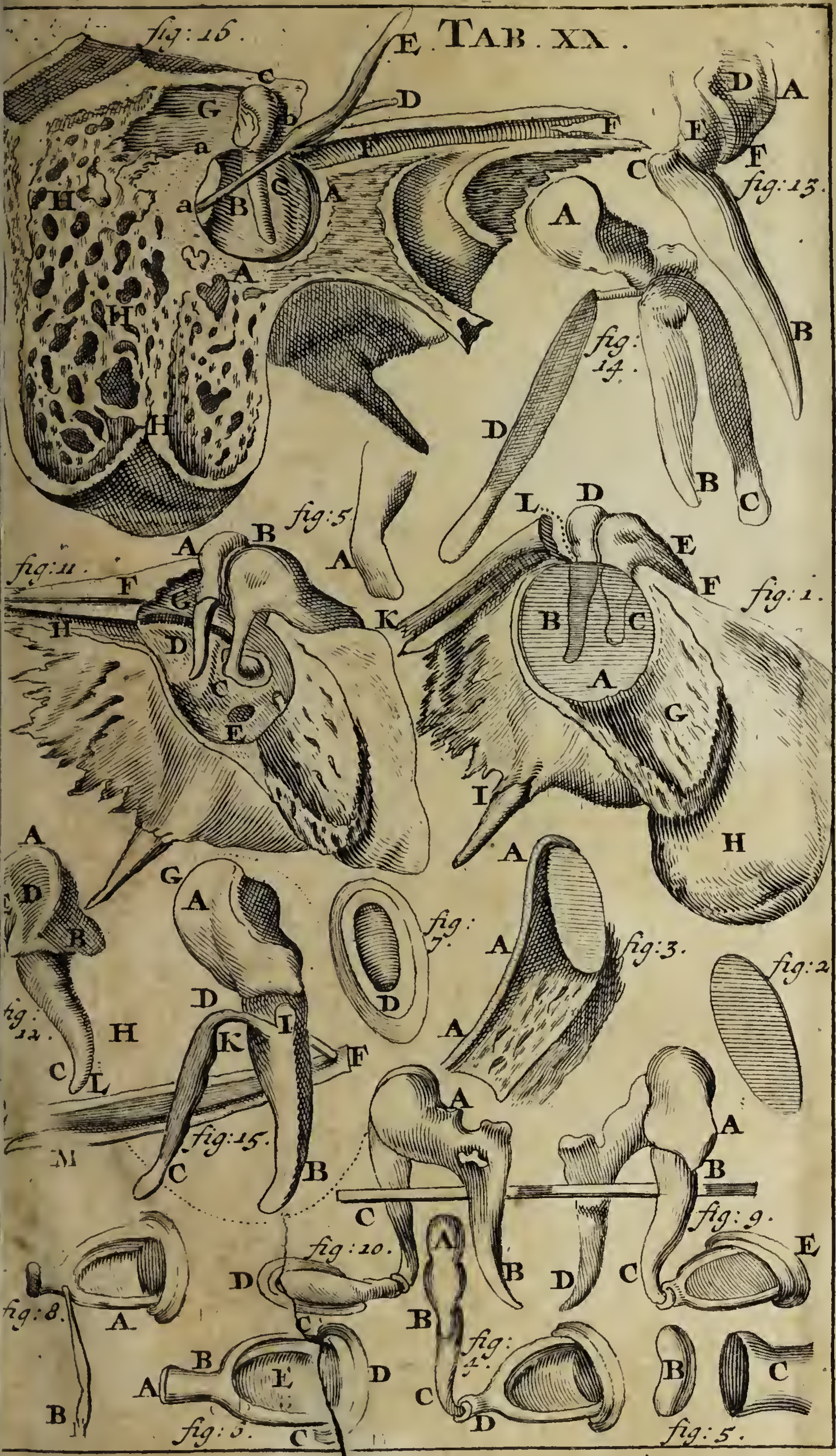

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fig:5.

Vaſa Præparantia.

THE SPERMATICK *Veſſels*, otherwiſe call'd, VASA PRÆPARANTIA, are *two Arteries* and *two Veins*, though in theſe Veſſels Nature does not always obſerve the ſame Rule, varying often their Number, Origination, and Inſertion; but moſt commonly they hold that Number.

Spermatick Arteries.

The *Spermatick Arteries* ordinarily ariſe from the fore-part of the Trunk of the *Aorta*, about two Inches below the Emulgents.

Peculiar *Structure of theſe* Arteries.

App. Tab. xxxii. Fig. 1.

The Structure of theſe *Arteries* is very Singular: For, contrary to the Courſe of all other *Arteries*, which are largeſt at their *Exit* from the Trunk whence they part, and grow gradually leſs in their Courſe, theſe are leſs in their Origin from the *Aorta*, than in their Progreſs towards the *Teſtes*. By this Stricture at their Orifice, the Blood receives a Check at its firſt going off for theſe Parts, whereby its *Impetus* and *Velocity* are abated. The ſame End is anſwer'd by a different Mechaniſm in *Quadrupeds*, whoſe *Spermatick Arteries* are curl'd and contorted in their Paſſage like a Screw. For which different Methods of doing the ſame thing, * Mr. *Cowper* gives a Reaſon, which ſeems to me beyond Exception juſt; (*viz.*) 'That if the *Human Spermatick* Ar-

* Phil. Tranſ. N°. 280. P. 1180.

‘ teries were contorted, as in *Quadrupeds*, ‘ the Apertures in the *Abdominal* Muſcles ‘ of Men, muſt be much larger than now ‘ they are, and would frequently let the ‘ *Inteſtines* deſcend into the *Scrotum*; an ‘ Accident, which, however, often happens. ‘ To ſuch *Ruptures* (as they are call'd) ‘ *Quadrupeds* are not ſo liable, though the ‘ Paſſages for the *Spermatick* Veſſels be much ‘ wider in them than in Men; becauſe the ‘ Poſition of the Trunks of their Bodies ‘ being *Horizontal*, their *Inteſtines* cannot ‘ preſs on the Proceſſes of the *Peritonæum*, ‘ as in Men whoſe Poſture is Erect.

Their Courſe. These *Arteries*, immediately after their meeting with the *Spermatick Veins*, enter together with them, the *inner Lamella* of the *Peritonæum*, which affords them a *Coat*, wrapp'd up in which they run along the *Pſoæ* Muſcles, till they reach the *Proceſſus* of the *Peritonæum*, beſtowing ſome Branches in their Paſſage upon the *Peritonæum*. Here inſinuating themſelves into the *Duplicature* of the *Proceſſus*, and being ſtreightly cloth'd with it, they paſs the *Foramina* of the Oblique and Tranſverſe Muſcles of the *Abdomen*, and at about three or four Fingers breadth from the *Teſticles*, are divided into two unequal Branches, the bigger of which goes to the *Teſticle* it ſelf, where, after having enter'd the Subſtance of it, it is ſplit

Ib. N.

And Diviſion.

Ib. O.

ſplit into an abundance of *Ramifications*, diſpos'd like the Tendrils of Vines, which are diſpers'd all through it. The leſſer deſcends to the *Paraſtata* or *Epididymis*, and is there diſtributed as the other is, in the *Teſticle*. Ib. P.

The *Proceſſus* of the *Peritonæum* embraces theſe Veſſels very cloſely, and together with them, exactly fills up the *Perforations* of the Muſcles, and ſo prevents the falling through of the *Inteſtines*, to which the erect Poſture might render them obnoxious if they were wider, as in Dogs, and ſome other Animals they are, whoſe *Horizontal* Poſture does not expoſe them to that danger.

Spermatick Veins. The *Spermatick Veins* take the ſame courſe with the *Arteries*, but a little above the *Teſticles* they ſplit into ſeveral Branches, which unite again ſeveral times, forming thereby that ſort of *Plexus* call'd, *Corpus Varicoſum Pampiniforme*, or *Pyramidale*. The Blood return'd by theſe *Veins*, is deliver'd on the right ſide to the *Cava*, a little above the *Exit* of the *Artery* from the *Aorta*, and on the left ſide into the *Emulgent Vein*, to avoid croſſing the *Great Artery*, in its paſſage over which, the Blood might be ſtop'd by the Pulſation of the ſubjacent *Artery*, or perhaps the *Vein* it ſelf be broken. In theſe Veins are divers *Valves*, as well in the Parts nearer to the *Teſticle*, as at

Corpus Varicoſum Pampiniforme

Valves.

Ib. ddddd

at their *Exit* into the *Cava*, and left *Emulgent.*

Nerves. Along with theſe Veſſels on each ſide, go two Branches of *Nerves*, one from the *Plexus* of the *Pelvis*, form'd out of the Branches of the *Intercoſtals:* The other from the ſecond Pair of the *Vertebræ* of the *Loins*, which latter however is very often not found.

Teſticles. The *Teſticles* are *ſoft white Bodies*, uſually in Number two, though ſome have naturally had *three*, and others but *one*; *Their Figure is Oval, and their ſize about the bigneſs of a ſmall Pullets or large Pigeons Egg.* They have been thought to have been of a *Glandulous* Subſtance, and according to the preſent prevailing Notion of the Structure of *Glands*, they may be allow'd to be ſo ſtill, notwithſtanding the diſcovery of that Inquiſitive *Anatomiſt* Dr. *De Graaf*, who finds them to be nothing but a Convolution of Veſſels of divers kinds, whereof the principal are the *Blood*-Veſſels before deſcrib'd, of which the *Arteries* bring the Blood from whence the *Seed* is to be ſeparated, and the *Veins* return it after that Separation made: The reſt of the *Teſticle*, which is much the greater part, is made up of *Seed*-Veſſels, which are indeed but one continued Series or Rope intricately convoluted, and wound up as it were into a Bottom, but adhering ſo laxly, that they are eaſily drawn out

Their Subſtance.

into

into length, and, in *Rats*, ſhaken from their cloſe Contexture, by firſt ſeparating the *Tunica Albuginea*, and putting the *Teſticle* into Water, and then agitating it lightly, theſe Seminal *Tubuli* will be very manifeſtly disjoyn'd.

How unravell'd in Rats. App. Tab xxxiii. Fig. 2.

Some have fancy'd *Glands* to be neceſſarily interſpers'd for the Separation of the Seed: But no Man has been able yet to demonſtrate them, nor does the Neceſſity appear, if we ſuppoſe, as at preſent many do, that all *Glands* are but a Convolution of the Sanguineous and Excretory Veſſels, though in other Parts their Texture be not ſo looſe, nor their Excretory *Tubules* ſo conſpicuous.

No interſpers'd Glands *to be found.*

Theſe *Seminal Tubuli*, or Veſſels, terminate in the PARASTATES or EPIDIDYMIDÆ, which are *tuberous varicoſe Bodies, lying upon, and adhering, to the upper part of the* TESTES, of which they ſeem properly a part, tho' of a different Form and Conſiſtence. For tho' the *Paraſtatæ* be only a various Convolution of the *Seminal Tubuli*, mix'd with the *Blood-*Veſſels, as the *Teſticles* themſelves are, yet here thoſe *Tubuli* being united into one, the various Convolutions of which, being more firmly bound together by a ſtrong Membrane, ariſing from the *Tunica Albuginea*, the Body of it feels more compact.

The Epididymidæ Ib. Fig. 1.

The

Proper Coats.

The *Teſticles* and *Paraſtates* are ſaid to be inclos'd in three *proper Membranes.* It is pretended the firſt is deriv'd from the *Cremaſter Muſcle*, which we take to be a needleſs Multiplication of *Membranes*, all *Muſcles*, like this, having their *proper Membrane*, which is all that is meant herein. This *Cremaſter Muſcle* preſenting it ſelf, muſt be removed before the *proper Membrane* of this part can be ſeen: It ſprings fleſhy from the Spine of the *Os Ilium*, and in its deſcent expands it ſelf on the Surface of the *Tunica Vaginalis*, to which it firmly adheres.

Muſculoſa.

Vaginalis

The *Tunica Elytroides*, or *Vaginalis*, is a Continuation of the external *Lamina* of the *Peritonæum*, and is liable to be divided into ſeveral Membranes, which ſome Anatomiſts pleaſe themſelves with. It incloſes the whole *Teſticle*. The third Coat is the *Albuginea*, ſo call'd from its colour, which is white. It is a ſtrong thick *Membrane*, very ſmooth on the outward Surface, the inward, which adheres to the Subſtance of the *Teſticle*, is rough and uneven. Into the upper part of this *Membrane* are inſerted the *Blood*-Veſſels, *Nerves* and *Lymphaticks*, which ſend from thence divers Branches into the Subſtance of the *Teſticle*.

Albuginea.

The Lymphæducts.

The LYMPHATICKS, which do not appear in the common Diſſections, ſhew themſelves pretty plentifully upon this *Membrane*,

Membrane, if a Ligature be laid upon the *Corpus Varicoſum*, of a *Dog*, or any other *Live* Subject. They go to the common *Receptacle* of *Chyle*.

The Scrotum.

The common *Capſula*, or *Membrane*, wherein the *Teſticles* are contain'd, is the SCROTUM. This conſiſts of two *Membranes*, the *Exterior* being only a Production of the *Cuticula* or *Cutis*, which is here ſomewhat thinner than in other Parts, without any *Fat* under it. The inner Membrane which is call'd *Dartos*, is only an Expanſion of the *Panniculus Carnoſus*, which, together with the *Cutis*, is drawn into the Figure of a Purſe externally, this Purſe is, as it were, divided by a Line which runs longitudinally, and parts it into the right and left ſide, and is call'd the Suture: Anſwering to this inwardly, is a Membrane which divides the Cavity juſt in the ſame manner, being only a Production of the *Dartos*, as the *Mediaſtinum* is of the *Pleura*. It is like that diviſible into *Lamellæ*, and the *Teſticles* are on each ſide looſly connected to it, by means of their outward proper *Tunic*. It ſerves to ſuſtain the *Teſtes*, and to defend them from Colliſion againſt each other, to prevent their falling down too low, in which it is auxiliary to the *Cremaſters*, and to promote the Corrugation of the *Scrotum*.

Membranes.

Dartos.

The Septum *of the* Scrotum.

From

The Vas Deferens App. Tab xxxii. Fig. I. L L L K.

From each *Teſticle* proceeds a round hollow Body, reſembling ſomewhat, in external appearance, a large *Nerve*, which is call'd VAS DEFERENS or EJACULANS. It ariſes from the Extremity of the *Epididymis*, and is nothing elſe but a Production of the Seminal *Tubulus* or Channel, which is continued from thence to the *Veſiculæ Seminales.* It is about the bigneſs of a ſmall Gooſe-Quill, and aſcending along with the *Vaſa Præparantia*, it makes ſeveral Serpentine or Worm-like Turnings and Windings, before it leaves the Body of the *Teſticle*, where it compoſes that Body call'd the *Epididymis*, and thence enters the *Abdomen*, with the aforemention'd Veſſels, through the Perforations of the *Tranverſe* and *Oblique* Muſcles. Having enter'd the *Abdomen*, it is reflected towards the back of the *Bladder*, and croſſing the *Ureter*, grows larger as it approaches the *Veſiculæ Seminales*, and then again contracting it ſelf juſt at the *Veſiculæ Seminales*, the two *Deferents* come together, and ſeem to paſs between them into the *Proſtates*, and through them into the *Urethra*, without communicating, till then, either with one another, or with the *Veſisulæ Seminales*, or *Proſtates.*

The Epididymis.

Controverſie concerning the Conveyance of the Seed *into the* Veſiculæ Seminales.

It has been a Controverſy among the *Anatomiſts*, whether the *Vaſa Deferentia* had any Communication with the *Veſiculæ Seminales*, or did depoſite into them the *Seed*,

Seed, which they convey'd from the *Teſticles.* Dr. *Wharton*, *Swammerdam*, *Van Horn*, and of late Dr. *Garth*, in his *Lectures* at the *College* of *Phyſicians*, have maintain'd the Negative, as others have done the Affirmative, whoſe Reaſons for their Opinions, we ſhall take notice of by and by.

Veſiculæ Seminales. App. Tab xxxiii. Fig. 1, 2.

The VESICULÆ SEMINALES, are *two Membranous Bladders*, ſituate between the *Veſica Urinaria* about the Neck, and the *Inteſtinum Rectum.* They are ordinarily three or four Fingers breadth long, and one broad, and about the third part of an Inch thick, though their Dimenſions vary very much in the ſame Subject, according as they are full or empty.

Cellulæ Veſicularum Seminalium

They conſiſt of divers Membranous Cells, which are plainly to be ſeen in a *Veſicula Seminalis*, blown up and dry'd, and afterwards cut. Theſe *Cells* open one into another, as appears by the ready Communication of the *Flatus.* They are not all of a ſize, but ſome are greater, ſome leſs, and all are form'd out of the ſame *Fibrous* Membrane, through the Contraction of which, by the Influx of the Animal Spirits in *Coitu*, ſome will have the Emiſſion to be occaſion'd; though I cannot think the *Fibres* ſufficient for that Purpoſe.

Convolutions of the Veſiculæ Seminales.

Theſe *Veſiculæ* appear externally, variouſly and unequally contorted and convoluted, reſembling the irregular Figure of the *Inteſtines* of a ſmall Bird, cover'd with a thin *Membrane*, upon which creep many Branches of *Arteries*, *Veins*, *Nerves* and *Lymphaticks*.

No Communication between the Veſicles.

From each ſide they empty themſelves, without communicating with each other, into a ſmall Duct, which about a Fingers breadth below the Neck of the Bladder, is inſerted ſeparately into the hinder part of the *Urethra*.

Septum ſeu Caput Gallinaginis.

Tab. iii.

Between the Mouths of each of theſe Ducts, is a ſmall *Septum* plac'd, to hinder the Seed coming from one ſide from ruſhing upon, and ſo ſtopping the diſcharge of the other. This *Septum* is call'd, *Caput Gallinaginis*, or *Galli Gallinacei*, and on each ſide of it, through the fore-mention'd Orifices, the *Seed* ruſhes into the *Urethra*.

Carunculæ *ſerving as* Valve. Tab. iv.

But leſt the *Seed* ſhould perpetually leak at each Orifice, a *Caruncle*, ſerving for a *Valve*, is plac'd, which hinders it from ouzing weakly out, but when it is emitted with vigour, gives way, and after the Force is over, recovers the Situation again.

The Proſtates.

Tab. Ib. & v.

The *Proſtates* form a *ſpongy glandulous Body*, *ſomewhat flattiſh on its upper Surface*, *ſituate juſt below the Neck* of the *Veſica*, *about the bigneſs of a Wall-nut*. Authors have aſcrib'd to it a Subſtance of two kinds; one *Glandulous*, and the other *Spongy* or *Porous*, which latter ſeems in reality to be nothing elſe, but a *Congeries* of very minute

Veſſels, and extreamly ſmall Membranous *Cells:* In the middle of *thoſe* run the *Excretory Ducts* of the *Veſiculæ*, paſſing quite through without any Communication. It has *Excretory* Ducts of its own pretty numerous. *De Graaf* does not remember to have obſerv'd them fewer than *ten* in *Men*, and in Dogs he has ſeen near an *hundred*. Every one of theſe diſcharges it ſelf into the *Urethra*, ſome above, ſome below the *Caput Gallinaceum*, but all more *laterally* than the Orifices of the *Veſiculæ Seminales*; having each of them its proper *Caruncle*. Out of theſe iſſues a ſort of *Glutinous tranſparent Liquor*, which ſome would have to be a *third* ſort of *Seed*, but in my opinion ſerves only to lubricate the Paſſage of the *Urethra*, and thereby to prevent any Adheſion of the *True Seed*, which might hinder it's being emitted with a ſufficient *Impetus*: The *Proſtates* are externally cover'd with a Fibrous Membrane, ſomewhat like that of the *Veſiculæ*, and through it are diſpers'd the ſame ſort of Veſſels, and from the ſame Parts, as *Arteries* and *Veins* from the *Hypogaſtricks*, and *Meſaraicks*, and *Nerves* from the *Plexus* of the *Pelvis*.

Their numerous Excretory *Ducts.*

Their Liquor no Seed.

Thoſe who with *De Graaf* (which is the greateſt part of Anatomiſts) hold that the *Veſiculæ Seminales* are *Receptacles* only of *Seed*, elaborated before in the *Teſticles*, and convey'd thither by the *Vaſa Deferentia*, are

Veſiculæ Seminales *the Receptacles only of the* Seed.

are preſs'd by the Arguments of their Adverſaries, who urge that the *Vaſa Deferentia* are continued down to the *Urethra*, without imparting or receiving any thing by the way; and this they infer from the *Vaſa Deferentia* being brought, as it were, below the *Veſiculæ Seminales*, and approaching them only at their Extremity, where, whatever they contain, ſhould rather, as they think, go out than come in. But, this is no concluſive Argument, unleſs they did prove by an abſolute Mechanical Neceſſity, that no Fluid in an Humane Body could enter, and come out again at different times, and under a different Force or Preſſure by the ſame Orifice.

Argument to the contrary from the Poſition of the Orifices *of the* Vaſa Deferentia *inconcluſive.*

That Objection anſwer'd.

Communication between the Deferents *and* Veſiculæ, *demonſtrated by* Blowing *into the* Deferents.

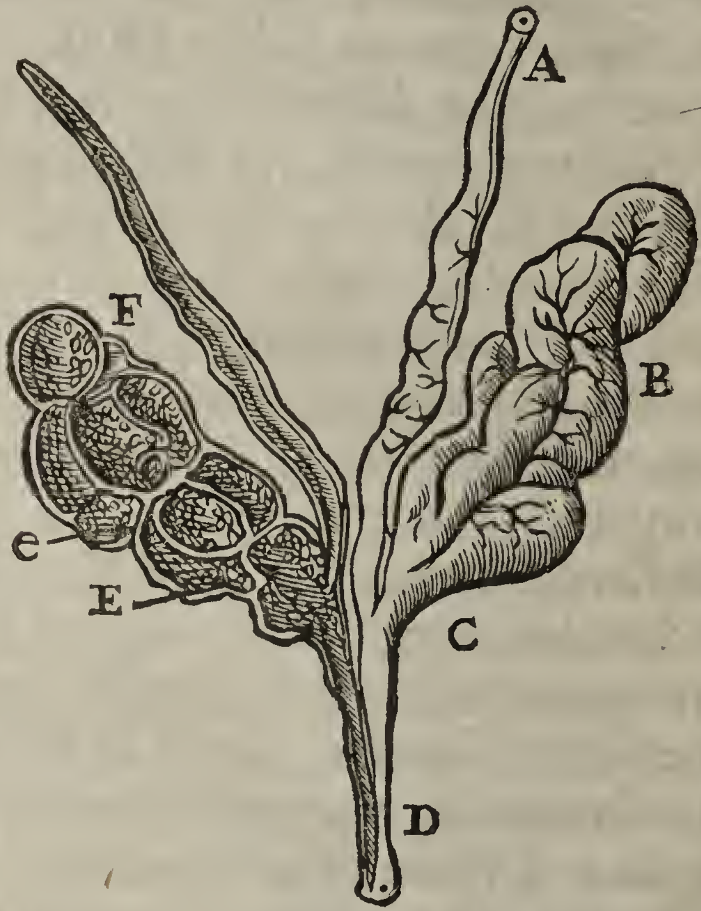
But, not to anſwer one Objection with another, which might eaſily be done, it is plain that the *Vaſa Deferentia*, and *Veſiculæ Seminales*, do communicate one with another, by the eaſe wherewith the *Flatus* paſſes from the *Vas Deferens* to the *Veſiculæ* of the ſame ſide, and the Facility wherewith it is blown up, or Liquors are injected by a Syringe that way. This proves that there is a Communication in Fact, and it is not ſufficient to ask, why Nature ſhould chooſe to make this Seminal Liquor, as it were, turn back again, to aſcend and fill the *Veſiculæ*, rather than to have inſerted the *Vas Deferens* into the upper part of it, and ſo to have fill'd it the more obvious way. For tho' we ſhould confeſs the reaſon of ſuch a Procedure to be ſtrange and incomprehenſible to us, yet that would not alter the Nature of the Fact. It ſhould, indeed, caution us to be more Modeſt in pronouncing concerning Particulars, whereof we were not ſufficiently inform'd, and rather incline us, ingenuouſly to confeſs our Ignorance, and to wait till time, and farther Application, or the Induſtry of others, ſhall open to us the Myſtery, than, when we cannot diſcover the real way by which Nature operates, to fall to inventing firſt the End, and then the Means, which has been an old, but a very diſingenuous Method of Philoſophizing in *Phyſick*.

Manner of their Communication

But the Difficulty before us, is neither ſo great, nor ſo puzling, as to force Men into any ſuch Shifts. For admit that the *Vaſa Deferentia* be continued to the *Caruncles* in the *Urethra*, yet if the Neck of the *Veſiculæ Seminales* joyn them higher, and form together one *Tubulus*; or if it be but inſerted into the *Deferens* with a patent Orifice, it is eaſie and Natural to conceive, that the *Seed*, that is but gently protruded along the *Vas Deferens*, arriving at the *Caruncle*, ſhould there be ſtopp'd, and the Protruſion ſtill continuing, ſhould rather deflect laterally into the *Veſicula*, which is open, altho' that may be call'd, in ſome meaſure, re-mounting, than force the Obſtacle of the *Caruncle*, whoſe reſiſtance is greater than that of the Weight of ſo much *Seed*, as one of theſe *Deferents* will contain.

Illuſtrated by the Deſcent of Water in a Fork'd Tube.

This is ſo far from being hard to be conceiv'd, that it is the conſtant and regular Courſe of all Fluids, in ſuch Caſes. For Example, Let us ſuppoſe a *Tube*, form'd in the Figure of a Y, or, which is all one, of the *Veſiculæ Seminalis* on the Left ſide here figur'd.



A. *The* Left Vas Deferens.
B. *The* Left Veſicula Seminalis.
C. *The Place of their* Communication, *at which the* Seed *is reflected into the* Veſicle.
D. *Their* Common Orifice *cloſ'd by a* Caruncle *inſtead of a* Valve.
F. *The* Right Vas Deferens *cut through after having been inflated and dried.*
E, e. *The* Cells *of the* Veſicula Seminalis, *as they appear in that State.*

If you pour Water into (A), it will readily deſcend to (D); but if at (D) there be a Valve plac'd, which neither the Weight of the Water, nor the Force of its Direction, are able to overcome the Reſiſtance of, then the Water will deflect at (C), and riſe up into (B).

The Mechaniſm Simple and eaſie of Conception

This Simple Piece of Mechaniſm, is what ſo many ingenious Men have ſtumbled at, and thought themſelves oblig'd to ſuppoſe, ſeveral ſorts of *Seed* to be form'd in theſe uncommunicating Parts: A trouble certainly they would not have put themſelves to, if they had obſerv'd how eaſily the *Flatus* paſſes in a Body recently dead. But perhaps the ill Succeſs of this Experiment, try'd upon a ſtale Body, when the Membranes were cold and ſtiff, and the Parts collaps'd and cohering, made theſe Learned Perſons maintain, that there was no Communication.

Doctrine of the ſeveral ſorts of Seed, why taken up of late.

We ſhall not ſpend any time in refuting that Doctrine of *three* ſorts of *Seed*, becauſe it was apparently taken up to avoid this Difficulty. The *Seed* of the *Teſticles*, and *Veſiculæ Seminales*, appear manifeſtly the ſame, and nothing was wanting to make them be allow'd ſo, but to prove the Communication: The *Proſtatal* Liquor is by moſt acknowledg'd not to be *true Seed*, no more than that which is emitted by *Women*: Nor is there any good Reaſon, why any Body ſhould call it ſo, the appearance being ſo very different, and another ſufficient Uſe found.

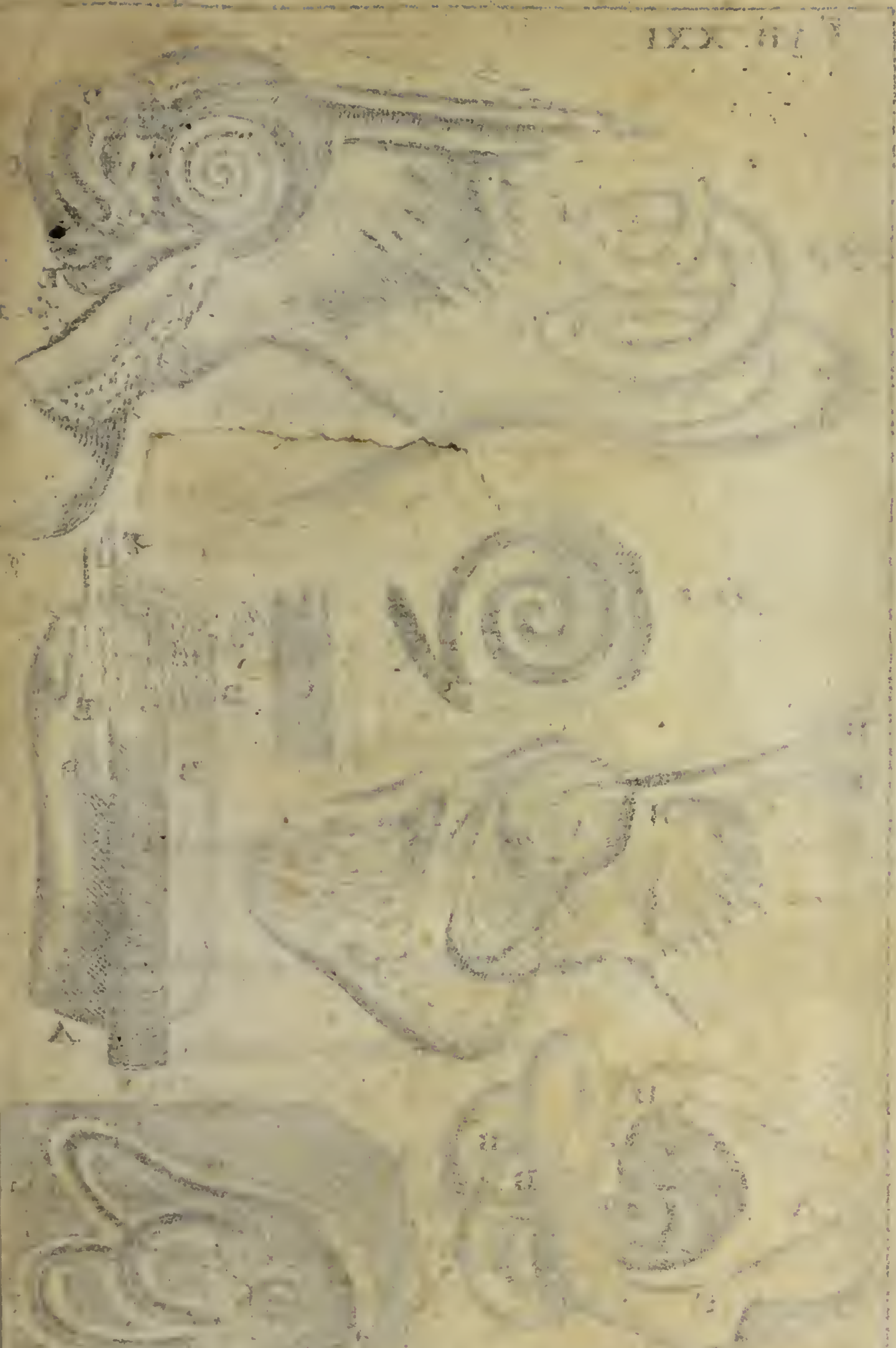
Glands *of the* Veſiculæ, *ſeparate no* Seed.

The Learned Dr. *Wharton*'s ground, of imagining a peculiar ſort of *Seed* to be ſeparated in the *Veſiculæ*, (which was his Obſervation of a great many *Glandules* in them, which he ſuſpected to be the *Organs* through which the *Seed* was ſeparated,) would have been more material than the former, if thoſe *Glands* which he mentions, had been conſiderable for their Number or Magnitude. But they are ſo far from being ſufficient for that Office, that they are not conſpicuous, and by moſt other Anatomiſts, have been unobſerv'd. *De Graaf*, who ſought for them expreſly, denies their Exiſtence. It ſeems therefore unreaſonable to aſſign that Office to them, whilſt their Exiſtence is controverted.

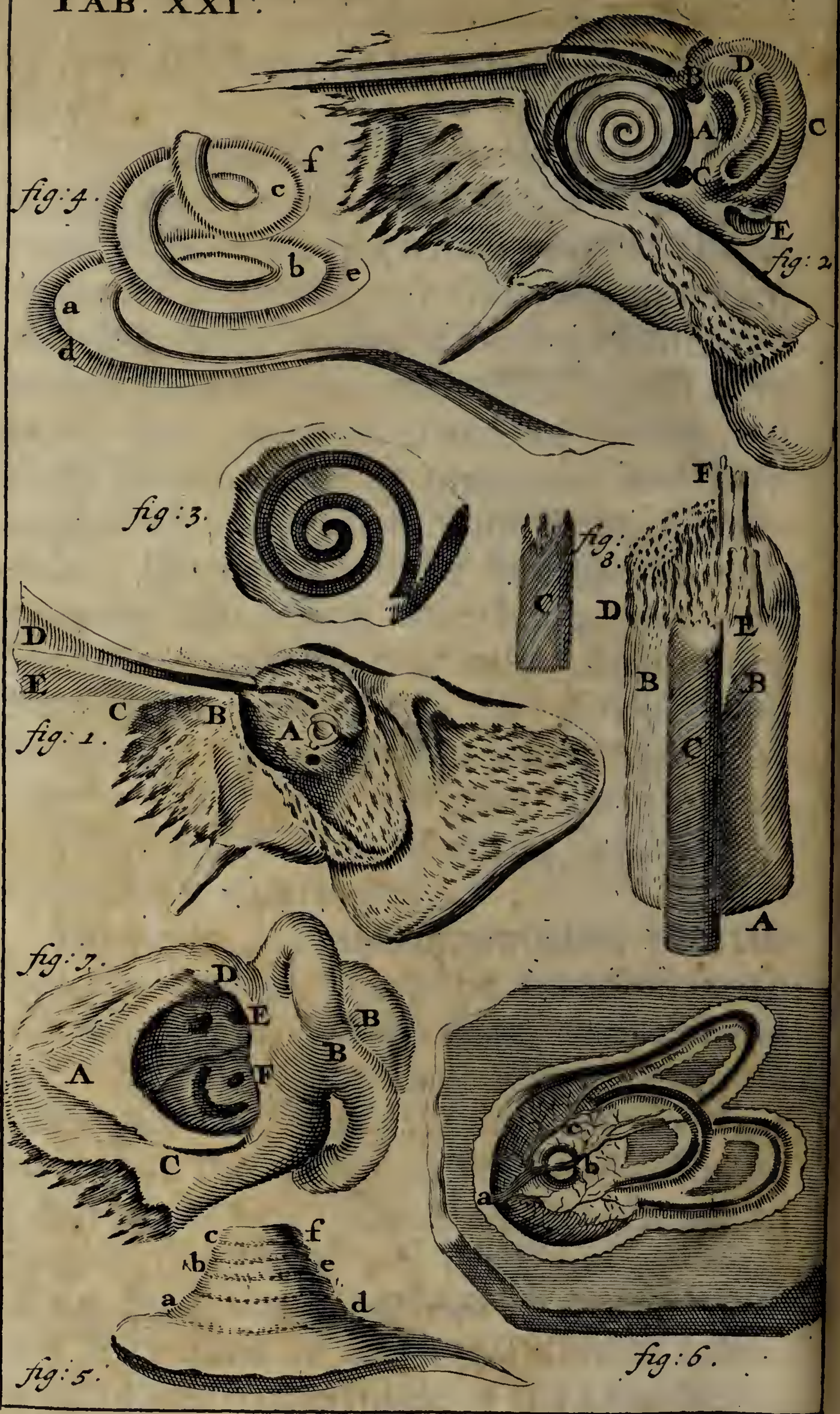
Probable uſe of thoſe Glands.

However, it is not improbable, that the *Veſiculæ Seminales* may be furniſh'd with *Glands*, as the *Veſiculæ Fellea*, and *Urinaria* are. But then we cannot aſſign them any other uſe, than thoſe *Glands* have in their reſpective Parts, that is, to afford a *Mucous* Lining with this difference, that it is not to protect the Membrane from any *Acrimony* of the *Seed*, but to *lubricate* it, and facilitate the Expreſſion of it, leſt it ſhould otherwiſe adhere to the Inſide of the Membrane, as all Viſcous Fluids are apt to do, to the ſides of a dry Veſſel.

CHAP.



TAB. XXI.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CHAP. XXI.

Of the PENIS.

SYLLABUS.

Præcipue Obſervandorum in

Pene
- *Cuticula*
- *Cutis*
- *Præputium*
- *Structura*
- *Ligamenta*
  - *Frænum*
  - *Suſpenſorium*
- *Glandulæ*
  - *Inguinales*
  - *Præputiales*
  - *Mucilaginoſæ Cowperi*
- *Corpora Cavernoſa*
  - *Penis*
  - *Vrethræ*
    - *eorum Subſtantia*
- *Bulbus----ejus Septum*
- *Glans*
- *Muſculi*
  - *Acceleratores Vrinæ*
  - *Directores*
  - *Tranſverſales*
    - *Penis*
- *Vaſa*
  - *Arteriæ*
  - *Venæ*
  - *Nervi*
  - *Lymphæductus*

THE CUTICULA of the PENIS, differs not from that of other parts, unleſs on the *Glans*, where it is very deli- *The* Cuticula.

cate and thin, and appears to have a ſmooth Surface, not rough and ſquamous, as that of other parts, when view'd with magnifying Glaſſes.

The Cutis *or* Skin. Tab. iv. A A. *The* Prepuce. Ib. a a. The *Skin* it ſelf is not ſo thick, as it's generally found on other Parts. The doubling of it on the *Glans* makes the *Præputium*. Nature does not ſeem more wanton in any part of her Works than in this, eſpecially the *Prepuce*, for the Figure and Proportion of which, I can ſcarce find any Standard. From hence, perhaps, aroſe the Neceſſity of *Circumciſion*, ſo generally practis'd in all the *Oriental* Parts, as well as among the *Jews* to this day. The firſt of which, uſe it out of Cleanlineſs, and to prevent Diſeaſes, which the Detention of the *Mucus* of the *Subpræputial Glands* might breed in thoſe Hot Countries. For even here I have ſeen ſome, who having large *Præpuces*, ſuch as they call Filberd *Præpuces*, who have been frighted at the odd appearance of that *Mucus* ouzing out, upon meer Plenitude, from between the *Præpuce* and *Glans*. Perhaps the Great Law-giver of the *Jews*, had a regard to this Convenience in the firſt Inſtitution of *Circumciſion*: For we ſtill meet with a great many Inſtances, where that Operation, or ſomething like it, is neceſſary. *The* Ligament *of the* Penis. It is tyed to the lower part of the *Glans*, by a *Ligament* call'd the

Frænum,

The Frœnum. Tab.vii. a

Frœnum. In this alſo Nature varies; for it's often ſo ſhort, that unleſs it be divided, it will not admit of perfect *Erections*.

Glands *under the* Prepuce. Tab. iii. a. b.

Uſe of the Liquor *they ſeparate.*

Cauſes of the Contraction *of the* Prepuce.

At the Connexion of the other part of the internal Skin of the *Præputium*, are divers Oval and roundiſh little *Glandules* placed irregularly, and that not only in the Neck, or joyning of the *Glans* to the *Corpora Cavernoſa*, but on the *Glans* it ſelf. By theſe *Glandules*, is ſeparated that Liquor that renders the Agitation of the *Præputium* on the *Glans* eaſie; when this Liquor becomes rancid, as it does in old People, and in *Venereal* Contacts, it excoriates the *Glans* and *Præputium*, and very often exulcerates, and renders the *Prepuce* liable to contract, and obliges the Patient to have it divided. The Extremity of the *Prepuce* is apt to grow ſo ſtrait in old Men, that they cannot bare the *Glans*, perhaps through the Defect of frequent Erections.

Ligamentum Suſpenſorium Penis. Tab. II. Fig. I. y.

The other *Ligament* belonging to the *Penis*, is call'd *Suſpenſorium*, from its Office, in holding up the *Penis* to the *Oſſa Pubis.* It ariſes from the fore-parts of thoſe Bones, and becoming thicker, divides for a Paſſage to the great Vein of the *Penis*, and is faſten'd to the upper parts of the *Corpora Cavernoſa Penis*, on each ſide the great Vein of the *Penis*.

No Fat *on the* Penis.

The *Penis* is naturally deſtitute of *Fat*, and when it happens to have any (as there are Inſtances) it is a Diſeaſe, and incommodes it in the execution of its Office. In Children you will commonly find *Fat* on the *Penis*, but in grown Bodies it's ſeldom found, tho' the *Membranes* between the *Skin* and *Corpora Cavernoſa* remain, and it's not improbable, that frequent *Erections* may prevent their *Cells* being charg'd with the *Oil*, which compoſes the *Fat*, as appears by the Microſcope. This want of *Fat*, makes the Skin of this part very looſe, and diſtendible, and the Membranous Body between the Skin and *Corpora Cavernoſa* diviſible into ſeveral Coats, as appears when this part becomes affected in an *Anaſarca*, in which the Membranes of this part, and the *Scrotum*, have been found thickned to more than three or four Inches. The external Teguments remov'd, the Body of the *Penis* offers it ſelf; Firſt,

Corpora Cavernoſa Penis. Tab. 3. P.P.A.D.

The two *Corpora Cavernoſa*, and the *Corpus Cavernoſum Urethræ*, and their Veſſels, frame the Body of the *Penis*. The two Cavernous Bodies, by ſome call'd *Corpora Nervoſa*, *Spongioſa*, &c. have two diſtinct beginnings from the lower ſides of the *Oſſa Pubis*, where they are ſmalleſt, which ſoon growing large and thick, joyn to each other, where they meet with the Cavernous Body of the *Urethra*, for which they leave an Interſtice, or Channel, in their lower ſide, wherein is receiv'd the *Cavernous Subſtance* of the *Urethra.* The ſuperior Surface of thoſe Cavernous Bodies, have a ſmall Interſtice, or Channel, alſo near the *Pubes,* in which the *Vena Penis* is lodg'd: Both theſe joyn by the Intervention only of a *Septum:* This, towards the back or upper part of the *Penis,* is very thick and ſtrong, and ſeems to be compos'd of the two outward thick Membranes, or Caſes of the *Corpora Cavernoſa* joyn'd to each other: The other Extremities of the two *Corpora Cavernoſa* are *Capt* with the *Glans.*

Their Septum. Tab. iv. Fig. ii. A A.

The third Cavernous Body of this part, is call'd *Corpus Cavernoſum Urethræ,* becauſe the *Urethra,* or paſſage of Urine in the *Penis,* is inclos'd with it. Its external Figure differs very much from that of the two *Corpora Cavernoſa,* for whereas they are leſſen'd at their two Extremities, this is there largeſt, and leſſen'd in its middle. Its upper part, that is plac'd between the two beginnings of the *Corpora Cavernoſa* before they unite, I call, after Mr. *Cowper,* its *Bulb,* from its Figure, which is large, thick and round, not unlike a Clove of Garlick, or an Onion. Its external Membrane is here very thin, and it is divided according to its length, by a *Septum* that is thickeſt toward the *Urethra,* which is not incompaſs'd with this *Cavernous* Body, till it paſſes under the two *Corpora Cavernoſa* at their meeting. This Bulbous part of the *Corpus Cavernoſum Urethræ,*

The Corpus Cavernoſum Urethræ. Tab. iv. Fig. i. L. M. N. O. Q.

Bulbus Urethræ. Tab. v. Fig. i. I.

Septum Bulbi. Tab. 7. Fig. 3. a. a.

Cut through in cutting for the Stone.

Vrethræ, is plac'd in that part call'd *Perinæum*, which is between the *Scrotum* and *Anus*, and is cut through to come at the *Vrethra*, in the Operation of Cutting for the Stone in the Bladder: It is cover'd with the *Muſculus Accelerator Vrinæ*, of which elſewhere. The middle part of this *Corpus Cavernoſum Vrethræ*, is almoſt Cylindrical, but the paſſage for the Urine is not through its *Center*, but inclines to its upper part next the Body of the *Penis*.

The Glans. Tab. iv. Fig. 1. N. O. Q.

The other Extremity of this *Corpus Cavernoſum Vrethræ*, is again dilated, and makes that Body, call'd the *Glans*, its external Figure, is well known; it receives the Extremities of the *Corpora Cavernoſa Penis*, in a Cavity or Depreſſure of it. Its internal reticular Subſtance is cloſer than that of the *Penis*. The Symmetry of theſe Parts being known, we come next to treat of their Veſſels, and Internal Structure: Firſt of

Arteries *of the* Penis. Tab. vi. Fig. 1. G. G.

The *Arteries*, which ariſe ſometimes from the Internal *Iliac* Branches, but moſt commonly from the lower parts of the *Vmbilical Arteries*, whence it is, perhaps, that this Part is leſs than uſual, by tying the Navel-ſtring too cloſe, not only by the Retraction of the *Vrachus* through its Continuity with the *Bladder*, and conſequently the *Penis*, but the *Arteries* of the *Penis* ſpringing from the *Vmbilical*, are liable to Coarctation, if they are over-extended, whereby the requiſite Plenty of Influent Blood is denied the *Penis*: Before theſe *Arteries* reach the *Penis*, they commonly ſend out two or three Branches on each ſide, the two Inferior of which, carry Blood to the *Muſculi Directores Penis.* The two Superior convey Blood to the adjacent parts, particularly to the *Muſculi Levatores Ani*, between which, and the *Muſculi Marſupiales Femorum*, theſe great Trunks paſs; but marching over the *Cavernous Bodies* of the *Penis*, they are both ſub-divided into two large Branches, the two Inferior of which (i i), paſs to the *Bulb* of the *Cavernous Body* of the *Urethra*; but the two Superior (k k), are both ſub-divided again; the External (d d) running on the ſuperior Surface of the *Cavernous Bodies* of the *Penis*; the Internal (l l) entring their *Capſulæ*, paſs through the middle of each *Cavernous Body* (D D), wherein they divide into innumerable Branches; from whoſe Capillary Extremities are continued ſo many *Veins*, in the Channels of which are divers Apertures into as many *Cells* (D), that communicate with each other, that empty themſelves into larger Venous Ducts (C), running on the ſuperior Surface of the *Penis*, ſome of which joyn with the Veins of the *Prepuce* (d), others make one large Trunk, which is call'd *Vena Penis* (M), marching on the *Dorſum Penis*, immediately under the

Muſculi Directores Penis.

Ib.

Ib.

Ib.

Ib.

Ib. Fig. ii.

The Veins *of the* Penis.

Ib. Fig. ii.

Tab. iii.

Ib.

the *Ligament*, that ties the *Oſſa Pubis* together internally; by which *Ligament* that *Vein* is compreſs'd in an *Erection*, as ſhall be ſhewn by and by; but this *Vein* proceeding farther on the *Proſtatæ*, it is there divided, and enters the *Internal Iliac Veins* on each ſide. The *Veins*, which ariſe in like manner from the *Corpus Cavernoſum Urethræ*, paſs from its *Bulb* through the *Muſculi Acceleratores* (C C), and are compreſs'd by thoſe *Muſcles*. Tab. vii. Fig. I.

Nerves. Tab. vi. Fig. I. H H. The *Nerves* ſpring from a Trunk compoſed by the *Coalleſcence* of the third of the *Os Sacrum*, and a Branch remitted from the great *Crural Nerve*, which after their union, provide *Nerves* for the *Teſtes*, *Perinæum*, and *Muſcles* of this part; which aſcending on the *Cavernous Bodies* of the *Penis*, expand themſelves on its upper Surface (c c), and are afterwards diſtributed to all the parts of the *Penis*. Ib.

Lymphæducts. Ib. L L. The *Lymphæducts* of the *Penis*, are very Numerous on its Surface under the Skin, in that looſe Membrane that is in the place of the *Membrana Adipoſa*. If you blow into the *Veins* of a *Dogs Penis*, its *Lymphæducts* will be inflated after its *Cavernous Body* is extended: *Theſe*, like the *Lymphæducts* of the lower parts, diſcharge their *Lympha* into the *Glandulæ Inguinales*: Hence, perhaps, the Morbid Matter in *Claps* is transferr'd into theſe *Glands*, and cauſes thoſe *Tumors*, Tab. vii. Fig. v. *Diſcharge themſelves into the* Inguinal Glands.

Tumors, call'd *Buboes*, from the *Glands* call'd *Bubones*. On this account the opening theſe Tumours, before the uſual time for *Suppuration* in other Tumours, appears neceſſary, leſt the Peccant Matter be convey'd by the exporting *Lymphæducts* of thoſe *Glands* into the Maſs of Blood; of which we meet with too many Inſtances.

The Cauſe of Buboes

The Internal Structure of the CORPORA CAVERNOSA, agrees exactly with that of the *Spleen.* The *Arteries* of the *Penis*, after they enter its *Corpora Cavernoſa*, are diſtributed into its *Reticular* Subſtance, which are chiefly compos'd of *Membranous Filaments*, deriv'd from the *Capſulæ* or ſides of the *Corpora Cavernoſa*, or their *Septa*; Theſe *Filaments* are variouſly intertext with (as they paſs from the ſides of the *Corpora Cavernoſa*,) and ſupport the Ramifications of the *Blood-Veſſels* and *Nerves*. The *Veins* of the *Corpora Cavernoſa* do not paſs from it, as they commonly do from other parts in particular Channels, but their ſides are here punch'd with numerous holes, that open into this *Cavernulous Subſtance*, which have ſuch Communications, as that if you blow into either beginning of the *Corpora Cavernoſa*, they both are readily diſtended; but the *Corpus Cavernoſum Urethræ* will not be affected, tho' the other two are diſtended with Wind, unleſs in ſome Subjects (which is very rare) in whom the *Veins* happen to

The Subſtance of the Cavernous Bodies.

Filaments. Ib. Fig iv.

Exact Reſemblance of the Structure of the Spleen.

to let the Wind paſs from the *Cavernous Bodies* of the *Penis*, to that of the *Urethra*. From this Structure of the *Penis*, we may be inform'd of the particular Uſe of its Parts.

Office of the Penis.

This Structure ſhews that the *Penis* is ſtrictly an Organ of *Generation* only, and that the conveyance of *Urine* was not conſider'd by Nature in this Mechaniſm, that being as well anſwer'd in Birds, Women, and all Female Creatures another way. But an Incitement to the Propagation of their Species had perhaps been wanting, but for this Organ; tho' the way of Propagation in moſt kinds of Fiſhes, ſeems to argue the contrary. But of that we ſhall have occaſion to ſpeak more at large hereafter. At preſent it may ſuffice, that without ſuch an Inſtrument, the *Seed* of the moſt *perfect* Animals could not be convey'd to the place of *Prolification*: And that an Alternation, as occaſion requires, of *Erection* and *Flaccidity*, was abſolutely neceſſary, the firſt, to the Performance of its Office, the latter, for the Security of the Part: Since without an *Erection* it were impoſſible to emit, and lodge the Seed where it ought to be, and with a Conſtant one, almoſt as impoſſible to ſecure the Part from many of thoſe Injuries to which it would be perpetually expos'd; not to mention the loſs of Inſtigation, which muſt be a neceſſary Conſequence of Conſtant Erection.

Penis, *how erected.*

That the Blood is the Matter which diſtends the *Corpora Cavernoſa Penis* in an Erection, is manifeſt from abundance of Experiments, tho' the moſt certain is that of firmly tying the *Penis* of any Animal, (as has been done frequently to a Dog) *in Coitu*, in which nothing but Blood has been found that diſtended it. In the Bodies of Criminals, that hang long after Death, the *Penis* becomes erected, the Blood, in that Poſition, falling to the Inferior Parts and ſtopping there. By blowing into the Blood-Veſſels after Death, the *Penis* becomes erected.

The Blood, *by what means detain'd.*

This was firſt obſerv'd by the Accurate Mr. *Cowper*, upon viewing its *Veins*, after he had diſtended them with Wind, whence it was very plain, that the *External Trunks* paſs'd ſome under its *Skin* only, and ſome over the *Oſſa Pubis*; which, for diſtinction, he call'd *Venæ Preputii*. Beſides theſe, a vaſt number of *Veins* (on the *Dorſum Penis*) unite, and empty themſelves into one *Trunk* call'd *Vena Penis*, which paſſes immediately under a Tranſverſe Ligament of the *Oſſa Pubis*, and is compreſs'd by the Approximation of the *Dorſum Penis*, to the Ligament of the *Pubis*. This Application of the *Dorſum Penis* is effected by its *Muſculi Directores*, pulling down the *Crura* of the

Corpora Cavernoſa Penis, which are ty'd up at their Juncture in the Body of the *Penis*, to the *Oſſa Pubis*, by the *Ligamentum Suſpenſorium* above mention'd.

Corpus Cavernoſum Urethræ, *how erected.*

This cannot happen to the *Cavernous* Body of the *Urethra*, becauſe there is no *Bone*, whoſe Poſition (in *Human* Bodies, and moſt *Quadrupeds*) can give riſe to a *Ligament*, which can have that effect on its *Veins*. Wherefore the *Muſculi Acceleratores*, embracing the *Veins* of the *Bulb*, do that Office, tho' not ſo effectually as in the *Penis* it ſelf; whence it is that the *Glans* is not always perfectly diſtended with the *Penis*, and ſooneſt becomes flaccid on an *Erection.*

Blood, *how its Circulation is continued in Erection.*

The *Blood*, by theſe means, being hindred in its retnrn, the *Corpora Cavernoſa* muſt neceſſarily be diſtended, if we conſider the Structure of them above mention'd, with reſpect to the *Veins*. The *Arteries*, which before were flaccid, have now their Trunks alſo extended, and do more plentifully import Blood into the *Corpora Cavernoſa*. But ſince it is abſolutely neceſſary, ſome part of the detain'd Blood ſhould be ſtill paſſing off, leſt it becomes Grumous and unfit for a Reflux, the *Venæ Præputii* communicate with thoſe of the *Penis* it ſelf, as before obſerv'd; whereby part of the Blood may be return'd from the *Penis* during its *Erection*, and give way to a freſh ſupply from the *Arteries*, and preſerve the *Circulation* in it uninterrupted. By this we are taught how to relieve an obſtinate *Priapiſm*, by opening the *Vein* of the *Penis*.

Analogous Structure. This admirable Contrivance, in diſpoſing theſe *Exporting Sanguiferous Ducts*, ſo that ſome are compreſs'd, whilſt others remain altogether free and open, is not only ſeen in the *Penis* of *Men*, and *Pudenda* of *Women*, but in thoſe parts of all other Animals, that have fallen under our Examination; with ſome difference of Inſtruments only, in ſome particular Creatures; as Mr. *Cowper* has inſtanced in the *Male Opoſſum*, *Philoſophical Tranſactions*, No. 290. P. 1584. *In the* Opoſſum. This Retardation of the *Refluent* Blood, is chiefly continued by means of a *Sphincter Muſcle*. *In the* Porpeſs. In a *Male Porpeſs*, long ſince diſſected by Mr. *Cowper*, were found *two Bones*, with their *Ligaments*, framed on purpoſe for this end. *In* Dogs. In a Dog he ſome time ſince obſerv'd likewiſe, a *Digaſtrick Muſcle*, whoſe *Middle Tendon* paſs'd tranſverſly on the *Veins* of that Animal's *Penis*, which ſeem'd to be provided by *Nature*, that when *in Coitu*, tho' the Dog is turn'd off the Back of the Bitch, and his *Penis* drawn off from the *Oſſa Pubis*, which, without that Tranſverſe Muſcle, would make way for the Blood to paſs off, and let its *Bulb*,

by

by which the *Dog* is ty'd to the *Bitch*, grow flaccid.

Muſcles *of the* Penis. Tab. vii. Fig. i. CC Tab. v. Fig. i. L. Accelerator Urinæ.

The *Muſcles* of the *Penis* are two Pair, and one odd *Muſcle*; the firſt, that offers it ſelf in Diſſection, is the ACCELERATOR URINÆ, which appears on dividing the *Skin* and *Fat* in the *Perinæum.* It's often joyn'd with the *Sphincter Ani.* It ariſes *Tendinous*, but ſoon grows *Fleſhy*, from the upper and fore-part of the *Urethra*, as it paſſes under the *Os Pubis*; its fleſhy part incompaſſing the *Bulb* of the *Corpus Cavernoſum Urethræ*; Both ſides of this Muſcle meet in a middle Line, correſponding to the *Seam* in the Skin over it: It continues ſo united about two Inches in length, then detaches two Fleſhy *Elongations* (c c), which become thin *Tendons*, at their Terminations on the *Corpora Cavernoſa Penis.* This, is commonly made a *Pair* of Muſcles, but in truth is but *One* Muſcle. Its upper part, that covers the *Bulb*, when in Action, ſtreightens the *Veins* that paſs through it from the *Corpus Cavernoſum Urethræ*, and hinders the *Reflux* of the *Blood* in an *Erection* of the *Penis*, and by the repeated Contractions of this upper part, drives the *Blood* in the *Bulb* towards the *Glans*: The two *Elongations*, that part on the *Urethra*, and aſcend to their Terminations on the *Corpora Cavernoſa Penis*, ſo compreſs its Channel, as to force out the contain'd *Seed* or *Urine*, from which latter Uſe it has its Name.

Tab. vii.

The *Erectores Penis*, ſo call'd from their uſe, ſpring Fleſhy each from the *Os Iſchium*, below the beginning of the *Cavernous Body* of the *Penis* on the ſame ſide, and after an oblique Progreſs, end partly Tendinous, and partly Fleſhy, in the beginning of that *Cavernous Body*. When *Theſe* act, the *Penis* is drawn to the *Pubes*, and by means of the *Ligamentum Suſpenſorium Penis*, its *Great Vein* is apply'd to the *Tranſverſe Ligament* of the *Oſſa Pubis*, and the Refluent Blood hindred from paſſing that way, whereby its *Corpora Cavernoſa* become diſtended. The laſt Pair of *Muſcles* that belong to the *Penis*, are call'd from their Poſition

Erectores Penis. T ib. F. ib. F, G.

Tranſverſales Penis. Theſe are often wanting, and frequently vary in different Subjects: Sometimes *They* are deriv'd from the *Sphincter Ani*, and terminate in the *Bulb* of the *Cavernous Body* of the *Urethra*. At other times you'll meet with a *Muſcle* on one ſide only: But ordinarily *They* ariſe from the *Iſchium* near the former, and are inſerted on both ſides the *Corpus Cavernoſum Urethræ*, immediately below its *Bulb*. When they Act, they dilate either the *Bulb*, or that part of the *Corpus Cavernoſum Urethræ*, to which they are faſten'd.

Tranſverſales Penis.

Tab. v. Fig. i. K. K.

Tab. vii. Fig. i. E E.

Mr. Cowper's Mucous Glands *of the* Urethra.

* Philoſ. Tranſ. N°. 258. *November* 1699.

There remain yet to be acounted for *Three ſmall* GLANDS diſcover'd by * Mr. *Cowper*, and not yet taken notice of by any other *Anatomiſt.* They all empty themſelves into the *Urethra*, and are by Mr. *Cowper*, from the Tenacity of the Liquor which they ſeparate, call'd the MUCOUS GLANDS of the *Urethra.* The two firſt diſcover'd of theſe are about the bigneſs of a French Bean, of a depreſs'd Oval Figure, of a yellowiſh colour like the *Proſtates*, and lie on each ſide the *Bulb* of the *Cavernous Body* of the *Urethra*, a little above it (G G). Their *Excretory Ducts* ſpring from their *Internal* Surface (A b), next the Inner Membrane of the *Urethra* (C), whence deſcending about half an Inch, they begin to grow leſs, and piercing that Membrane obliquely, open into the *Urethra* at (D) by two diſtinct *Orifices* juſt below its bending, under the *Oſſa Pubis in Perinæo*, where they diſcharge a *Tranſparent Viſcous* Liquor.

Tab. v. Fig. 1.

Ib. Fig. ii.

Ib.

Mr. Cowper's *Third* Mucous Gland *of the* Urethra.

Beſides this Pair, there is a *Third* MUCOUS GLAND, diſcover'd likewiſe by the ſame Mr. *Cowper*, to whoſe happy Sagacity, Induſtry, and Communicative Temper, the Inquiſitive into this part of Knowledge are infinitely indebted. This is deſcrib'd by him in the Appendix to his ’Ευχαριστία, and is a ſmall Conglobate yellowiſh Gland like the former, but ſomewhat leſs. It is ſituate about the Angle of Flexure of the *Urethra*, under the *Oſſa Pubis* in the *Perinæum* near the *Anus* (F), as it was drawn from a Preparation, which Mr. *Cowper* has ſtill by him. To find this *Gland*, the *Corpus Cavernoſum Urethræ* muſt be divided lengthways to the *Inner* Membrane of the *Urethra*, which muſt be cautiouſly freed from the Body; which done, the *Gland* will appear in the Place already mention'd. It has two *Excretory Ducts*, which enter the *Urethra* obliquely about a quarter of an Inch below the Orifices of the two former (K), and diſcharge a Liquor like theirs both in Colour and Conſiſtence.

Tab. iv. Fig. ii.

Tab. ib. Fig. i. *Where the* Excretory Duct *of the* Right *ſide only is expreſs'd.*

Mr. *Cowper*, who is always Ingenious, and generally Right in his Conjectures about Anatomical Matters, thinks there may be two Uſes of this *Mucus* The Firſt, to hinder any Remains of *Urine* from mixing with the *Semen*, in the *Urethra tempore Coitus*, which I can find no reaſon to expect there at that time. Yet I muſt ſubſcribe to his Opinion, that *the main Deſign of Nature, in framing theſe Glands, ſeems to reſpect the Grand Work of Generation.* For by their Situation, they muſt neceſſarily be compreſs'd upon Erection,

ction, and conſequently diſcharge their Contents before the *Teſtes* and *Veſiculæ Seminales*, which are not ſubject to ſo immediate a Force. I apprehend therefore, that their *Mucus* ſerves to lubricate the Pipe of the *Vrethra*, and thereby to facilitate the *Emiſſion* of the *Semen*, and render it more Vigorous and Projectile, than otherwiſe it could probably be, if ſo viſcid a Liquor, as the *Semen*, were to paſs through a Channel abſolutely dry, to which it would be apt to adhere, and ſo its Projection be obſtructed.

Much leſs can I think, that they were by Nature contriv'd to defend by the *Mucus*, which they afford, the *Vrethra* from the Acrimony of the *Vrinous* Salts. For, to anſwer that end, the *Vrethra* ſhould be conſtantly lin'd with it, and the diſcharge continual, as it is in a *Gleet*, when the *Caruncula*, which cloſes the *Excretory Duct* of any of theſe *Glands*, happens to be eroded, as we obſerv'd it once in a Servant of mine; of which Mr. *Cowper* has given us the Hiſtory, and the Figure, in his *Deſcription* of *theſe Glands*, publiſh'd before his 'Ευχαριστία, both which I have thought worth the transferring hither. But as theſe *Glands* do not emit their Liquor *in Statu Sano*, but upon Compreſſion, which cannot happen but in Erection, and that a pretty ſtiff one too, by reaſon the Reſiſtance of the *Caruncle* muſt be forc'd, it is not probable, that this Liquor ſhould be always diſcharg'd previous to the *Urine*, which is as often made with a *Flaccid Penis* as otherwiſe. Nor indeed do I ſee any need to hunt for any other Uſe, than that which I have aſſign'd in the preceding Paragraph.

Cauſe of Inveterate Gleets.

Mr. *Cowper* having, with his Deſcription of the firſt diſcover'd *Pair* of the *Glands*, hinted his Suſpicion, that an *Inveterate* * GLEET might proceed from a *Venereal* Ulcer happening upon the *Oſtiolum* of either of theſe, whence, if an abſolute *Eroſion* of the *Caruncle* enſued, an *Incurable Gleet* might follow, an opportunity preſented it ſelf to me, to examine into the certainty of that Opinion, in a Servant of mine who died of a *Peripneumony*, but had been ſome Years troubled with an Obſtinate *Gleet*. In this Subject we found that the *Caruncle*, which ſhould have clos'd the *Duct* of the *Mucous Gland* on the Left ſide, had been eroded by an Ulcer, and the Orifice of that, and of the Left *Duct* of the ſingle *Mucous Gland*, laid into one, as appears by Tab. IV. Fig. I. (*) drawn from it by Mr. *Cowper*. Hence proceeded an almoſt conſtant Dripping of a Diaphanous Viſcid Roapy Liquor, ſuch as theſe *Glands* furniſh, which is what we call a *Gleet*,

* Philoſ. Tranſ. *November* 1699.

a *Gleet*, and muſt neceſſarily happen to all Perſons under the like Circumſtances.

What a Clap *is.* He that conſiders, that a *Clap* is nothing but an Ulcer rais'd in the *Urethra*, by the Inſinuation of ſome *Virulent*, or to ſpeak more properly, *Acrimonious* Purulent Matter into it, will not wonder, that it ſhould often hang and fix its Seat at the *Oſtiola* of theſe *Excretory Ducts*. But of theſe Matters I ſhall take another Occaſion to ſpeak more largely.

TAB. III.

THE Fore-parts of the *Bladder* of *Urine*, and *Corpora Cavernoſa Penis*,&c. ſomewhat leſs than the *Life*.

A A. The whole *Corpora Cavernoſa Penis.*

a a. Their Extremities which are capt with the *Corpus Cavernoſum Glandis Penis.*

B. The Skin of the *Penis*, which makes the *Præputium.*

h. Its *Duplicature* or internal Surface, that is continued to the *Glans.*

C D. The *Blood-Veſſels* on the *Dorſum Penis*, fill'd with *Wax.*

c c. Their Trunks cut from the *Glans.*

d. A Trunk of the *Vein* that receives Branches from the *Præpuce*, by which the *Wax* was injected, to fill the *Veins* at M D C.

E. The *Glans Penis* fill'd with *Wax*, by the *Vein.*

e. A Portion of the *Urachus.*

F. The Fore-part of the *Bladder* of *Urine.*

f. Its inward *Nervous Membrane*, through which the order of *Muſcular Fibres* may be ſeen.

g g. The two Orifices of the *Ureters*, as they open into the *Bladder.*

h. The ſmall *Glands*, which may be ſeen by the naked Eye, between the two Orifices above mention'd, that ſeparate the *Mucus*, which defends this Internal *Membrane* of the *Bladder* from the *Salts* of the *Urine.*

G G. The *Ureters* cut off.

H H. Portions of the *Vaſa Deferentia.*

I I. Parts of the *Veſiculæ Seminales.*

K K. The Fore-part of the *Proſtates*, which are here divided together with the *Urethra.*

L. The *Caruncle*, or *Caput Gallinaginis*, which hinders the *Seed* from perpetually leaking at the two Orifices on each ſide of it here mark'd o o.

i i. The *Mouths* of the *Excretory Ducts* of the *Proſtates*, on each ſide the *Caput Gallinaginis.*

M. That part of the *Vein* of the *Penis*, that is compreſs'd by the *Ligament* of the *Pubis*, in an *Erection.*

N N. The *Arteries*
O O. The *Nerves* } on the *Dorſum Penis.*

P P. The beginnings of the *Corpora Cavernoſa Penis*, cut from the *Oſſa Pubis.*

Q Q. The *Muſculi Directores Penis.*

R R. The *Urethra* divided and expanded.

S. The *Mucous Gland* of the Right ſide pinned out.

t. The Orifice of its *Excretory Duct*, as it appear'd with its *Mucus* in it, ready to be diſcharg'd.

r. The *Mouth* of the *Excretory Duct* of the Left *Mucous Gland*, which was very open in this ſubject, being in common with another *Mucous Gland* of the ſame ſide, expreſs'd in the following Table, Fig. 1. *. and Fig. 2. F.

TAB. IV.

FIG. I.

THE Fore-part of the *Urethra* open'd, to ſhew the *Orifices* of the *Excretory Ducts* of the *Mucous Glands*, ſomewhat leſs than the *Life*.

A A A. The inſide of part of the *Bladder* of *Urine*.

B. A *Probe* in the Left *Ureter*, to ſhew its entrance into the *Bladder* of *Urine*.

C. The Right *Ureter*, whoſe lower part is ſlit open, to ſhew its Oblique Inſertion between the *Membranes* of the *Bladder*, before it opens into its Cavity.

D. The *Miliary Glands* of the *Bladder*.

E E. Parts of the *Veſiculæ Seminales*.

e. The *Blood-Veſſels*, which are diſtributed on the *Veſiculæ Seminales*, and lower parts of the *Vaſa Deferentia*.

F F. The *Proſtates* divided and open'd.

f f f. The ſides of the *Urethra* divided and pinn'd out.

G. The *Caruncle* or *Caput Gallinaginis*, with the *Mouths* of the *Excretory Ducts* of the *Proſtates* on each ſide, as in the preceding Table i L.

H H. The two firſt and largeſt *Mucous Glands* pinn'd out,

I I. Two *Probes* in their *Excretory Ducts*, of which, the Orifice of the Right ſide is in its Natural State:

(*) The other * was inlarged in this ſubject by an *Ulcer*.

K. A ſmall *Probe* in the *Excretory Duct* of lower and leſſer *Mucous Gland*, vid. Fig. 2. F.

L. The *Bulb* of the *Cavernous Body* of the *Vrethra* fill'd with Wax.

M M. The ſides of that *Cavernous Body* fill'd with Wax; and divided according to its length, to ſhew its inſide.

N. The *Glans Penis* fill'd with Wax, from the *Vein* mark'd d. in the preceding Figure.

O. The Cavity fram'd in the *Corpus Cavernoſum Glandis Penis*, in which the Extremities of the *Corpora Cavernoſa Penis*, of the foregoing Figure mark'd a a a, are receiv'd.

Q. The upper part of the *Glans* next the *Penis.*

P. Part of the *Membrana Carnoſa Penis* pinn'd down.

FIG. II.

Part of the *Bladder* of *Vrine* and *Vrethra* of a *Boy* inflated.

A. The lower and hinder part of the *Bladder* of *Vrine.*

b. B. The *Veſiculæ Seminales* blown up by

C C. The *Vaſa Deferentia.*

D. The *Proſtates.*

E E. The *Vrethra* clear'd from its *Cavernous Body.*

F. The leſſer *Mucous Glands* plac'd at the Angle, or turning of the *Vrethra* under the *Oſſa Pubis.*

TAB. V.

FIG. I.

A, A Portion of the *Bladder* of *Urine.*

B B, Parts of the *Ureters.*

C C, Parts of the *Vaſa Deferentia.*

D D, The *Veſiculæ Seminales* ſomewhat diſtended with Wind, by blowing into the *Vaſa Deferentia.*

a a, The Blood-Veſſels of the *Veſiculæ Seminales.*

E, The *Glandulæ Proſtatæ.*

F, The *Urethra* expanded after opening its ſuperior and fore part to ſee the *Oſtiola* of the *Excretory Ducts* of the following *Glands.*

G G, The *two Glands* above deſcrib'd, which from the Liquor they ſeparate, (are call'd by Mr. *Cowper,* who diſcover'd them) *Glandulæ Mucoſæ.*

h, The *Excretory Duct* of one of the laſt mention'd *Glands,* before it paſſes under the *Bulb* of the *Cavernous* Body of the *Urethra.*

I, The *Bulb* of the *Cavernous* Body of the *Urethra,* partly diſtended with Wind, and diveſted of the *Accelerator* Muſcle, to ſhew its External Membrane, which is very thin, whereby the laſt nam'd Muſcle does more adequately compreſs the *Bulb*, and drive its contain'd Blood towards the *Glands,* when the *Penis* is erected.

K, The third Pair of Muſcles of the *Penis.*

L L, The *Accelerator* Muſcle divided in its middle *Seam* on the *Bulb,* and afterwards freed from it, and Expanded.

l l, The upper part of the *Muſcle*, which paſſes immediately over the *Mucous* Glands.

M M, The *Muſculi Directores Penis.*

N N, The *Cavernous* Bodies of the *Penis.*

O, The *Cavernous* Body of the *Vrethra.*

P, The *Ligature* made to prevent the Wind from paſſing out of the *Cavernous* Body of the *Vrethra* and its *Bulb.*

Q, The Aperture by which the Inflation was made.

FIG. II.

ONE of the *Mucous* Glands, after being macerated in Water, and its *Excretory* Duct fill'd with *Quickſilver.*

A, The *Mucous* Gland ſomewhat diſtended.

b, Its *Excretory* Duct.

C, A Portion of the *Internal Membrane* of the *Vrethra* Expanded.

D, The *Oſtiolum* of the laſt mention'd *Excretory* Duct.

T A B.

TAB. VI.

FIG. I.

THE Fore-part of the Human *Penis* prepared with *Mercury*.

A A, The Skin, together with the reſt of the Common Integuments of the *Penis*, freed from it.

a a, That part of them which compoſe the *Præputium*.

B, The beginnings of the *Corpora Cavernoſa* ſeparated from the *Oſſa Pubis*.

b b, The Veins; c c, The Nerves; d d, The (cc)
Arteries, as they appear on the back-part, or (dd)
Dorſum Penis.

C, The *Glans* or *Balanus*.

D D, The *Muſculi Erectores*.

E E, The *Tranſverſales*.

F, Part of the *Sphincter Ani*.

f, A Blow-Pipe in the *Urethra*.

G G, The Trunks of the two Arteries of the
Penis, Cut from the Internal Branches of the
Iliac Arteries: gg, Their two Inferior Branches (gg)
which run to the *Muſculi Erectores*; h h, Their (hh)
ſuperior Branches which adminiſter Blood to
the adjacent Parts; i i, Thoſe Arteries which (i i)
paſs to the *Bulb* of the Cavernous Body of the
Urethra; k k, Their large Trunks which are (kk)
ſubdivided again; the External of which d d, (dd)
paſs on the ſuperior Surface of the *Penis*; the
Internal l l, enter the *Corpora Cavernoſa*. (ll)

H H, The Nerves of the *Penis*.

I, The *Vena Penis*.

KK, *Venæ Præputii* which inoſculate with the former.

LL, The *Lymphaducts*.

FIG. II.

THE two *Corpora Cavernoſa Penis*, and that of the *Urethra*, after a Tranſverſe Section, when Inflated and dry'd.

AA, The *Corpora Cavernoſa Penis*.

B, The *Corpus Cavernoſum Urethræ*.

C, The Trunk of the *Vena Penis*.

DD, The Trunks of the two Arteries paſſing through the *Corpora Cavernoſa* of the *Penis*.

TAB. VII.

FIG. I.

THE Back part of the Human *Penis.*

A, The *Balanus.*

a, The *Frænum.*

B, The External Surface of the *Corpus Cavernoſum Vrethræ.*

CC. Its *Bulb* cover'd with the *Muſculus Accelerator*; b, The Conjunction of its Right ſide (b)
with the Left, correſponding to the Seam of
the Skin in the *Perinæum*; cc, Its two Extremi- (cc)
ties embracing the *Corpus Cavernoſum Vrethræ*,
which terminate on the ſides of the Cavernous
Bodies of the *Penis* it ſelf.

D, Part of the *Sphincter Ani.*

EE, The *Muſculi Tranſverſales Penis.*

FF, The *Directores* or *Erectores.*

GGGG, The *Corpora Cavernoſa Penis.*

HH, The Arteries; ddd, Thoſe Branches ad- (ddd)
miniſtring Blood to the *Muſcles*; ee, Two large (ee)
Trunks of them which are ſubdivibed into two
more, f g. (f g)

II, The Nerves of the *Penis.*

FIG. II.

SHews the Internal parts of the Extremities of the two Cavernous Bodies, and that of the *Glans Penis.*

A, The *Dorſum Penis*, cover'd with its *Capſula.*

B, The External part of the *Glans.*

a, Part of the *Septum* of the *Corpora Cavernoſa.*

bb, The Internal Membrane of the *Corpora Cavernoſa Penis*, cover'd by the *Glans.*

C, The *Corpus Cavernoſum Glandis Penis*, on the Extremities of the *Corpora Cavernoſa Penis.*

FIG. III.

EXhibits the *Bulb* of the Cavernous Body of the *Urethra*, being dry'd after Inflation.

A, The External part of the *Bulb*, diveſted of the *Muſculus Accelerator Urinæ.*

B, Part of the *Bulb* raiſed after Section, to ſhew its Internal Cavernous Structure.

a, *Septum Bulbi.*

CC, *Muſculi Tranſverſales.*

FIG. IV.

SHews part of one of the Cavernous Bodies of the *Penis*, being likewiſe dried after Inflation.

A, That part of the *Capſula* of the Cavernous Body next the *Os Pubis*, which is here compreſs'd by the Ligature made to retain the Wind.

B, *Muſculus Erector Penis.*

CC, The Artery as it is diſtributed within the Cavernous Body of the *Penis* on either ſide.

FIG. V.

REpreſents the *Bulb* of a Dog's *Penis* after Inflation.

A, The External Surface of the *Bulb.*

B, A Ligature made on a Vein that ariſes from the ſuperior part of it, into which the Veins of the *Prepuce* enter, and may therefore be call'd *Vena Præputii.*

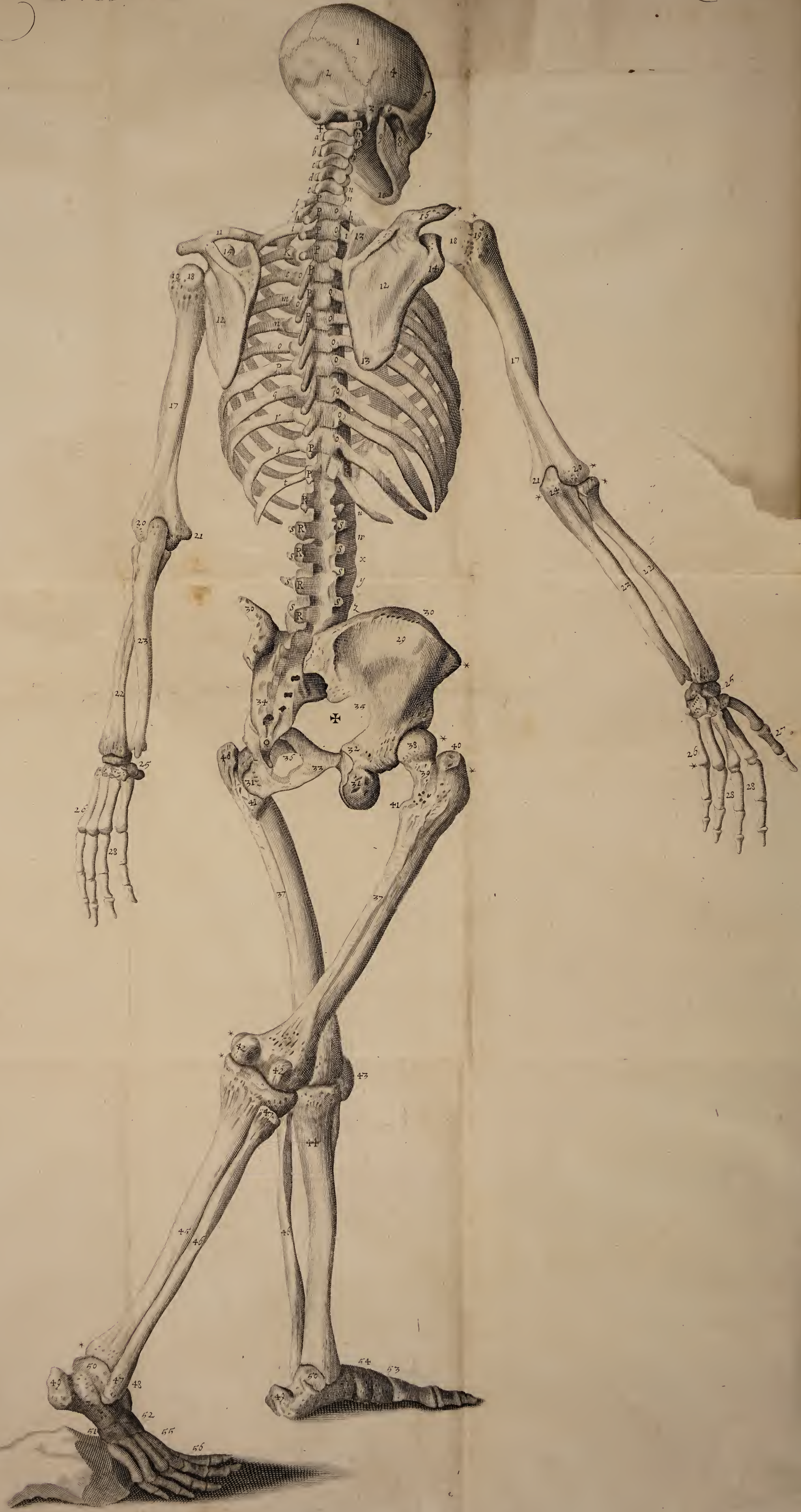
CC, The large Trunk of one of the Veins of the *Penis* it ſelf, which in this Animal is double, ariſing from each ſide the *Bulb.*

D, The Internal appearance of the *Corpus Cavernoſum* of the *Bulb.*

EE, The Cavity of the Vein which communicates with the *Cavernulæ* of the *Bulb.*

FF, *Corpus Cavernoſum Penis.*

Tab. XXII.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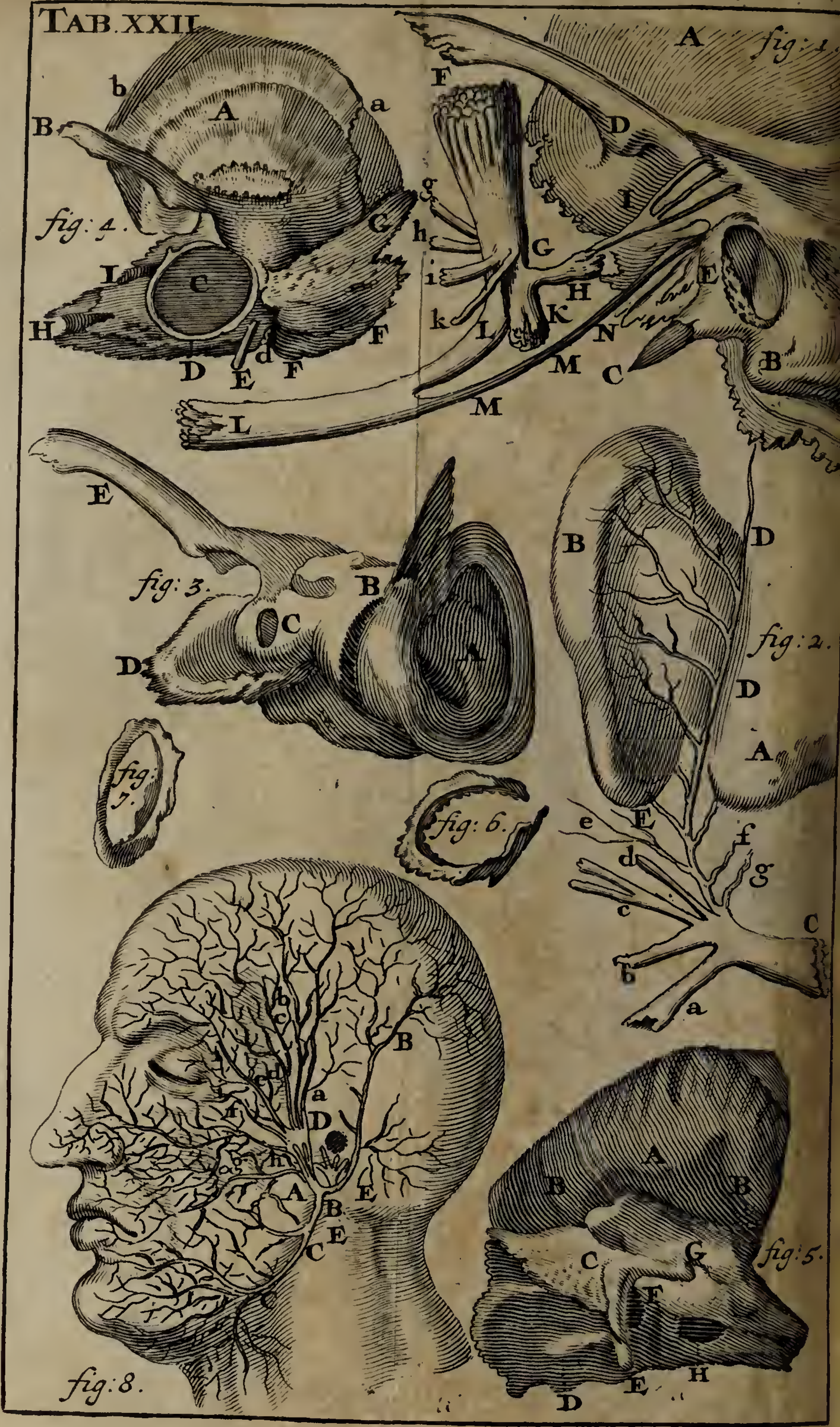
TAB. XXII.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CHAP. XXII.

Of the Organs *of* Generation *in* Women.

SYLLABUS.

Eorum quæ ſeſe offerunt conſpectui circa

Pudendum Muliebre Seu

- *Externum*
  - *Rima*
  - *Labia*
  - *Mons Veneris*
    - *Glandulæ Miliares*
    - *Adeps*
    - *Pili*
  - *Clitoris*
    - *Corpora Cavernoſa*
    - *Crura*
    - *Glans*
    - *Muſculi*
    - *Vaſa*
  - *Nymphæ*
  - *Orificia*
    - *Meatus Vrinarii*
    - *Vaginæ*
  - *Hymen*
    - *Situs*
    - *Structura*
    - *Foramen*
  - *Carunculæ Myrtiformes*
  - *Plexus Reticularis*
- *Internum*
  - *Vagina Vteri*
    - *Subſtantia*
    - *Orificium*
    - *Rugæ*
    - *Oſtia*
  - *Vterus*
    - *Figura*
    - *Magnitudo*
    - *Cervix*
    - *Fundus*
    - *Cavitas*
    - *Orificium*
    - *Subſtantia*
    - *Tunicæ*
      - *Exterior Membranea*
      - *Media Muſculoſa*
      - *Interior Nervea*
    - *Connexio*
    - *Ligamenta*
      - *Lata*
      - *Rotunda*
    - *Vaſa*
  - *Tubæ Fallopianæ*
    - *Membranæ*
    - *Expanſum Foliaceum*
  - *Ovaria*
    - *Figura*
    - *Magnitudo*
    - *Membrana*
    - *Subſtantia*
    - *Ova*
    - *Lymphæductus*

App.Tab. xxxiv.

HItherto we have follow'd the Method, that the Connexion and Dependance of the Parts upon one another have led us into. But this being a ſingle Subject, and a Specification of the Difference betwixt Sexes, we ſhall follow the Method of *De Graaf* in it, as the moſt Natural, and the moſt Eaſie for an Inquirer to follow.

Diviſion. The PUDENDUM MULIEBRE is divided into Parts *External* and *Internal*: The *External* are thoſe which offer themſelves to the View without Diſſection, tho' ſome of them require a Diduction of the *Labia* before they can be ſeen. Theſe are the *Rima*, *Labia duo*, *Mons Veneris*, *Clitoris*, *Nymphæ duæ*, the *Exitus* of the *Meatus Urinarius*, and the Orifice of the *Vagina*.

External *Part of the* Pudendum.

Rima. The *Rima* is nothing elſe but the External Aperture ſituated below the *Os Pubis*, between it and the *Anus*; and the ſpace betwixt the *Rima* and the *Anus* is call'd the *Perinæum*.

Labia. Tab. viii. Fig. ii & iii. The Skin on each ſide of the *Rima* is ſupported and plump'd up with the *Fat* of the *Membrana Adipoſa*, which is here thicker than ordinary, and makes together the *Labia*.

Mons Veneris. Juſt above the *Labia*, between the *Inguina*, is the ſpace, which is call'd the *Pubes*, the middle and moſt prominent part of which, has been nam'd *Mons Veneris*, which is a little Protuberance occaſion'd by the more than ordinary collection of *Fat* under the Skin in that place. All theſe parts are cover'd with Hair, as moſt other parts, where the *Miliary* Glands of the Skin are larger than ordinary, and cover'd with *Fat*, uſually are.

Theſe being abſolutely External, are expos'd to view without Diduction, and they, as well as the Adjacent, have been call'd by variety of Names, which either the Wantonneſs, or other Humours of Men, have furniſh'd them with: But thoſe being of no ſervice to our preſent Purpoſe, we ſhall omit them, and ſtick only to the moſt Simple and Familiar of them among Anatomiſts, as Modeſty directs us.

Clitoris. Tab. viii. Fig. iii. App. Tab xxxiii. Fig. vi.

In the upper part of the *Pudendum*, juſt within the *Labia*, is the CLITORIS; a Body ordinarily about the ſize of the *Uvula* when it is not relax'd. But ſometimes, by extraordinary Means, and in extraordinary Caſes, it will be extended almoſt to the bigneſs of the *Penis* of a Man, which at all times it reſembles very exactly in its Figure, except that it is not perforated. The extraordinary Size of this part, and its Propendence ſometimes out of the Body in *Infants*, makes the Women miſtake ſuch Children for that ſort of Monſters they call *Hermaphrodites*. Of this ſort I had one brought to me upon another occaſion, the *Clitoris* of which hung out of the Body ſo far, at about three Years old, that it reſembled very much a *Penis*, but it wanted

Hermaphrodites

the Perforation, and inſtead of that, juſt behind it, the Urine iſſued at a hole, which was nothing elſe but a corner of the *Rima*, the *Clitoris* filling all the reſt of the Orifice: So that the Parents miſtook it for a Boy, and as ſuch Chriſtned it, and as ſuch eſteem'd it when it was brought to me. But the Neighbours, who had notice of this Appearance, call'd it an *Hermaphrodite*.

Corpora Cavernoſa Clitoridis.

The *Clitoris* conſiſts of two Nervous or Spongy Bodies, like thoſe of the *Penis*, which have their Origine from the lower part of the *Os Pubis* on each ſide, which coming together form the Body, which is call'd the *Clitoris*: Which tho' it has no Perforation Analogous to that of the *Penis*, yet has a *Septum*, or Membranous Partition, which runs all along between theſe two Nervous Bodies, from the *Glans* to its Divarication at the *Os Pubis*, where they are call'd *Crura Clitoridis*, and are near three times as long as the ordinary Trunk of the *Clitoris* it ſelf.

Septum Clitoridis.

Crura.

Glans Clitoridis.

Tab. viii. Fig. ii.

At the end of it is a *Glans*, reſembling in Proportion, that of the *Penis*, except, as has been ſaid, the Perforation. This *Glans* is covered with a *Præputium*, form'd out of the inner Membrane of the *Labia*.

Muſcles *of the* Clitoris.

The *Clitoris* has a pair of *Muſcles* ariſing from the *Oſſa Coxendicis*, and terminating in its *Crura*, and ſerving to erect the *clitoris*.

Some Authors aſcribe another Pair of *Muſcles* coming from the *Sphincter Ani*, which are by others thought only to be the *Conſtrictory* Muſcles of the *Vagina*, and aſſiſt in hindring the Reflux of the Blood from the *Clitoris*, &c. *in Coitu*. App. Tab xxxiii. Fig. vi.

It has *Arteries* from the *Pudenda*, and its *Veins* return to the *Hypogaſtricks*. The *Nerves* come from the *Intercoſtals*, and run in pretty large Twigs along the back of it. Hence it is that it appears ſo extreamly affected in the Act of Coition. Blood-Veſſels.

After the Blood-Veſſels and Nerves have parted with Branches to the *Clitoris*, they are partly ſpent in a Cavernulous Subſtance, call'd, by *De Graaf*, *Plexus Reticularis*, that environs the *Pudendum* immediately under the *Nymphæ*, to which they alſo ſend Branches: All theſe Parts being fill'd with Blood, do more adequately embrace the *Penis in Coitu*; and by their intumeſcence they not only force out the Contents of the *Lacunæ*, or Excretory Ducts of the *Proſtatæ*, or *Corpus Glanduloſum*, in the Neck of the Bladder, but by excluding the external Air, the *Semen Maſculinum* is injected to the *Fundus Uteri* and *Fallopian Tubes*; and that more eſpecially, if we conſider that the *Parietes* of thoſe Parts are furniſh'd with a vaſt Number of Blood-Veſſels, eſpecially Veins, and on their Intumeſcence, that the internal Air muſt be rarified in thoſe Corpus Cavernoſum ſeu Reticulare Pudendi. Tab. ix. Fig. ii.

thoſe Cavities, by which means the *Semen Maſculinum* paſſes to the *Ovaria*.

Nymphæ Tab. viii. Fig. ii. The *Nymphæ* or *Alæ*, are ſoft, ſpongy, red Bodies, deſcending from the top of the *Clitoris*, (to which they firmly adhere) to the ſides of the *Meatus Urinarius*, thereby reaching to about the middle of the Orifice of the *Vagina*, where growing inſenſibly leſs and leſs, they diſappear: So that their length may be accounted, from the *Clitoris* to the middle of the Orifice of the *Vagina*: Their breadth is very uncertain, but in Maids uſually about that of half a Finger. They are ſometimes found much larger, and are capable of being diſtended to a great degree, ſo as to hang a good way out of the Body, and in ſome, theſe, as well as the *Clitoris*, have been forc'd to be cut.

Their Figure taken together, is a kind of half Oval. Their Subſtance is ſoft and ſpongy, compos'd of Membranes and Veſſels loosely cohering, and therefore eaſily diſtendible. Tab. viii.

Uſe of the Nymphæ The Uſe of them is by Swelling in the Act of Coition to embrace the *Penis*, and by their Senſibility to affect the Woman, and mutually to invite to Procreation. They have their Blood-Veſſels and Nerves in common with the *Clitoris*.

Orifice *of the* Vagina. Fig. iii. Juſt behind the *Nymphæ*, is the Orifice of the *Vagina*, which in Virgins, eſpecially ſuch as have not yet had the *Catamenia*, or but very rarely, is very ſtreight, but in thoſe that have had them oftner it grows larger, but more in Married Women, and moſt in thoſe that have had Children.

Orifice *of the* Urethra.

Juſt above the *Orifice* of the *Vagina*, is the ORIFICE of the URETHRA, opening with a little Intumeſcence. It is externally cover'd with a whitiſh Subſtance, which is partly Glandulous, and partly Membranous, out of which iſſues a Glutinous Limpid Matter through certain Ducts, which comes from the inward part of the *Meatus*, and ſerves to anoint the Extremity of the *Urethra*.

Hymen.

Fig. iv.

In the Diſſection of theſe Parts, nothing has more exercis'd the Curioſity of Anatomiſts than the *Hymen*, who not only differ and contend about the Figure, Subſtance, Place and Perforations of it; but even about the Exiſtence it ſelf, which ſome poſitively affirm; others as flatly deny. And even *De Graaf* himſelf, the moſt induſtrious and accurate Inquirer into theſe Parts, confeſſes that he always ſought it in vain, tho' in divers Subjects, and in various unſuſpected Ages. All that he could find, was a different Streightneſs, and different Corrugations, which were greater or leſs, according to the reſpective Ages: The Younger they were, the *Foramen* being the ſtraiter, and the Rugoſities the greater, the former the neceſſary Conſequences of the latter. For as in time the Parts grew, the Membranes were extended, and ſo the Surface of them grew gradually more ſmooth and plain.

Whether it is to be found in all Subjects, I dare not affirm, but in thoſe few which I have had opportunity to examine, I do not remember to have miſs'd it in any Subject where I had juſt reaſon to depend upon finding it, if it were conſtant. The faireſt View which I ever had of it, was in a Maid who dy'd at about Thirty Years of Age.

Its Deſcription.

App. Tab xxxiii. Fig. ix & x.

In Infants it appears to be a fine thin Membrane, not very conſpicuous, becauſe of the Natural Straitneſs of the Paſſage it ſelf, and of the *Foramen*, which tho' very ſmall, did not allow of any great Expanſion in ſo little room, and conſequently might appear to *De Graaf* a Corrugation only of the inner Membrane. But in this Subject we found it to be a Membrane of ſome Strength, furniſh'd with Carnous Fibres, in Figure round, and perforated in the middle with a ſmall Hole, capable of admitting the end of a Womans little Finger, ſituate a little above the Orifice of the *Meatus Urinarius*, at the Entrance of the *Vagina*.

Situation

It is probable that this Membrane, as moſt others do, grows more diſtinct, as

An imperforate Hymen.

well as firm, by Age: And that it is ſometimes very ſtrong and impervious, may be collected from the Hiſtory of a Caſe reported by that Skilful Anatomiſt Mr. *Cowper*, in his *Explications* of the *Fifty firſt Table of* Bidloo's *Anatomy. I was call'd* (ſays he) *to a Married Woman of above Twenty Years of Age, whoſe lower Belly was diſtended as if with Child. Upon examining the* Pudendum, *we found the* Hymen *altogether impervious, and driven out beyond the* Labia Pudendi, *in ſuch manner, that at firſt ſight it appear'd not unlike a* Prolapſus Uteri. *In the upper part towards the* Clitoris, *we found the Orifice of the* Meatus Urinarius *very open, and its ſides extruded, not unlike the* Anus *or* Cloaca *of a Cock, and without any difficulty I could put my Fore-Finger into the Bladder of Urine. On dividing the* Hymen, *at leaſt a Gallon of Grumous Blood, of divers Colours and Conſiſtencies, came from her, which was the retain'd* Menſtrua. *The next day no leſs Quantity of the ſame Matter flow'd, after removing the Peſſary, which I had put in the day before. After three or four days ſhe was eaſy, and ſoon after recover'd, and within a Year was deliver'd of a healthful Child. Her Husband told us, tho' lying with her at firſt was very painful to himſelf as well as her, yet at laſt he had a more eaſie Acceſs, which could be no other way than by the* Meatus Urinarius.

This Hiſtory proves, that this Membrane is not only a ſtrong Membrane, which could make reſiſtance to that force, which overcame the *Meatus Urinarius*, and *Sphincter* of the *Bladder* which is conſiderably ſtrong: But by admitting of ſo great a Dilatation, as to hang *Extra Pudendum*, ſhews that the Structure of it is Fibrous, and conſequently capable of great Diſtenſions.

Whether this Membrane be always to be found in unvitiated Subjects, is more than I can pretend to determine. The Scarcity of them in Adult, will not let me preſume to decide upon my own Obſervation, and much leſs can I do it upon any Agreement of Authors: Among whom I find ſome, who are moſt accurate, doubtful about its Exiſtence.

Caruncul æ Myrtiformes.

App. Tab xxxiii. Fig. xi. B B.

Adjoyning, or rather in the place of this *Hymen* in Adults, in whom it is not found, are four little *Caruncles*, or *Fleſhy Knots*, about the bigneſs of *Myrtle-Berries*, from whence they are call'd *Myrtiformes*, which ſome ſuppoſe to be largeſt in Maids, and by degrees to grow leſs through the uſe of *Venery*: Others, with more probability, in my Opinion, derive them from the broken Membrane of the *Hymen*, whoſe Fragments ſhrunk up, they take them to be. Which of theſe is in the right, I am not able poſitively to ſay, having yet never ſeen them, where the Uſe of *Venery* had not preceeded.

The Moſaical Teſt *of* Virginity, *why too ſevere for theſe* Northern Climates

The *Moſaical* Teſt of *Virginity* has occaſion'd abundance of Speculation about theſe Parts, concerning which, the Niceſt Inquiries can ſettle nothing certain. Whatever might be depended upon among the *Jews*, in theſe Countries there may not be the ſame reaſon to expect thoſe *Tokens* of Virginity, tho' not at all to be ſuſpected. For, beſides that they married extreamly Young, as it is the Cuſtom of all *Eaſtern* Countries ſo to do, (whether a *Hymen* be conſtantly to be expected or not) there are many Circumſtances which may diſappoint ſuch Expectations, even in Virgins not vitiated by any Male-Contact, or Wantonneſs of their own. For, whatever may be the Caſe of thoſe Countries, in theſe Northern Climates the Inclemency of the Air expoſes them to ſuch Checks of Perſpiration, as give a great Turn to the Courſe of the Humours, and drives ſo much Humidity through thoſe Parts, as may extraordinarily ſupple and relax thoſe Membranes, from which the reſiſtance is expected, and from which, in hotter Countries, it might more reaſonably have been depended upon. Not but that thoſe Marks are ordinarily found here, but in ſome that have liv'd long Virgins, or are of very delicate Conſtitutions, the long Courſe, or extraordinary Turn of Humours that way, may render Men unjuſtly Suſpicious, where no real Occaſion is given. For in ſome, who preſerve their Virginities a great while, and in others, whom a delicate Conſtitution expoſes to a long or great Courſe of Humours through thoſe Parts, ſuch a Relaxation may be occaſion'd, as may deceive and offend thoſe Men, who expect certain Marks of Virginity, eſpecially where a *Hymen* is wanting, which (for any thing that appears to me) may be miſs'd oftner than it is found.

Fruſtrated often by Diſeaſes.

But even ſuppoſing a *Hymen* whole and unbroken, that, and the Membranes of the *Vagina*, may be ſo relax'd, through a long and great Courſe of the *Catamenia*, or from the Morbid dripping of the *Fluor Albus*, that the Pureſt Virgin may not be able to anſwer here Mens Expectations from the *Moſaical Teſt*, whatever might be juſt in thoſe hot Countries.

All that is certain in this Caſe, is, that they who have plainly the *Moſaical* Signs of Virginity, cannot be ſuſpected; the others may, tho' perhaps unjuſtly. There are other Accidents which may diſappoint theſe Expectations of Virginity, without any treſpaſs on the Womans part, which, without a Hiſtory of the Diſeaſes of thoſe Parts, (which it is not our Intention to give here,) it is improper to enumerate.

TAB.

TAB. VIII. From *Swammerdam.*

FIG. I.

THE Fore Proſpect of the *Uterus* of a Woman after Delivery.

AA, The *Spermatick Arteries.*

BB. The *Spermatick Veins* diſtributed through the *Tubes* and *Fundus* of the *Uterus.*

CC, The *Corpora Pyramidalia*, compos'd of the *Spermatick Arteries* and *Veins.*

DD, The *Membranous* or *Broad Ligaments* of the Womb, through which the *Blood-Veſſels* paſs to the *Fallopian Tubes*, call'd by ſome, *Alæ Veſpertilionum.*

EE, The *Fallopian Tubes* well expreſs'd.

FF, Their Aperture at the *Expanſum Foliaceum*, on each ſide.

GG, The *Round* or *Inferior Ligaments* of the Womb.

H, The Origination of the *Veins* and *Arteries* of thoſe *Ligaments.*

I, The *Valve* in the *Vein* of the *Round Ligament* hindring the Relapſe of the *Blood* to the *Uterus.*

KK, The two *Hypogaſtrick Arteries.*

LL, The *Hypogaſtrick Veins* variouſly contorted, and in their Progreſs implicated and perplex'd with the *Arteries.*

M, *Fundus Uteri.*

N, The *Cervix*, or Neck of it, at the end of which, is the inner Orifice of the Womb.

OOO, The *Arteries* on the *Fundus*, or Bottom of the Womb, curl'd like the *Tendrils* of a *Vine.*

PP, A great number of *Veins* running over the Exterior *Tunic* of the *Uterus*, in which the *Anaſtomoſes* are ſingularly remarkable.

Q, The *Vagina Uteri.*

R, The *Bladder* of *Vrine*, inverted to ſhew the Tortuoſity of the *Arteries* of the *Vagina*, by which means its proper *Veſſels* are repreſented ſomewhat longer than they ought to be.

S, The Orifice of the *Vrethra* in the *Vagina.*

TT, The *Vreters.*

VV, The Inſertion into the *Bladder*, which is here turn'd downwards.

X, Part of the *Vrachus.*

YY, The *Vmbilical Arteries.*

FIG. II.

EXhibiting the *Pudendum* of a Virgin, taken freſh out of the Body and diſplay'd.

A, The *Glans* of the *Clitoris* reſembling that of a *Penis.*

B, The *Prepuce* of the *Clitoris.*

CC, *Labia Pudendi.*

DD, *Nymphæ.*

E, The Orifice of the *Vrethra.*

F, The *Caruncle*, that cloſes the *Meatus Vrinarius*, in which are divers *Fiſſures.*

G, The *Hymen.*

FIG. III.

THE *Pudendum* of a Virgin with its *Clitoris* dried.

A, The *Glans* of the *Clitoris*, anſwering that of a Man.

B, The *Prepuce* of that *Glans.*

CC, *Labia Pudendi.*

DD, *Nymphæ.*

E, The Orifice of the *Meatus Vrinarius.*

F, The *Hymen.*

G, The Perforation of the *Hymen.*

HH, The *Crura* of the *Clitoris* cut to ſhew the Subſtance of its *Cavernous Bodies*.

I, The Urinary Paſſage cut off near the *Bladder.*

K, The Neck of the *Uterus* cut off.

FIG. IV.

A, THE Perforation, or Slit of the *Hymen.*

B, The upper part of the *Hymen* next the *Meatus Vrinarius.*

The *Meatus Urinarius* in Women is very ſhort: It is lin'd internally with a very thin Membrane, and next to that is a Coat of a white Subſtance, of which an account is given in the Deſcription of the Orifice; Through this Coat, from ſome *Lacunæ* in it, thoſe Ducts paſs, which convey the Liquor ſpoken of before in the account of the Orifice: It is very dilatable, as the Practice of Extraction of Stones, (of extraordinary Size) without cutting, proves; as well as the Hiſtory before recited under the *Hymen*.

Meatus Urinarius. App. Tab xxxv. Fig. i.

The *Vagina* of the *Uterus*, is a Membranous part, reaching from the *Rima* juſt above the *Labia*, to the Neck of the *Uterus*; It lies upon the *Inteſtinum Rectum*, to which it firmly adheres, and under the *Veſica Urinaria*. It is reckon'd to be ſeven or eight Inches long.

Vagina Uteri. App. Tab. ib. Fig. ii.

The inward Subſtance of it is Nervous, and exquiſitely Senſile: The outward Membranous, and of a looſe Texture, with carnous Fibres running longitudinally upon it.

Subſtance.

At the Orifice it is much narrower than elſewhere, particularly in Virgins, eſpecially very young ones. Through the whole Courſe of it, it appears to be wrinkled, eſpecially on the upper internal Surface. The Uſe of *Venery* renders theſe *Rugæ* leſs appa-

Orifice. Rugæ.

rent; and frequent *Parturition* almoſt obliterates them; which ſhews that they were contriv'd to render the Part more eaſily diſtendible for *Parturition.*

Oſtia Vaginæ. App. Tab. ib. Fig. ib. Along the whole Tract of the *Vagina*, there are a great many Pores, or *Oſtia*, or *little Ducts* to be ſeen, which in Acts of *Venery*, emit a Liquor, that has been by many miſtaken for *Seed*, and are found in greateſt Plenty about the lower part of it, eſpecially about the *Exitus* of the *Meatus Urinarius.*

The *Vagina* has likewiſe a *Conſtrictory* Muſcle inſerted under the *Clitoris*, which, with a broad Series of Fibres embraces, and conſtringes the lower part of the *Vagina*, ſpoken of before.

Uterus. Tab. ib. Fig. ib. The *Uterus* or *Matrix*, is ſituated in the *Pelvis* of the *Hypogaſtrium*, between the *Inteſtinum Rectum*, and the *Urinary Bladder.* It is ſurrounded and defended by mighty Bones, before by the *Oſſa Pubis*, behind by the *Os Sacrum*, on each ſide by *Its* Figure the *Os Ilium*, and *Iſchium.* It is in Figure ſomething like a flat Flask, or a dry'd Pear. In Women that are with Child, it receives different Forms, according to the different Times and Circumſtances of *Geſtation.*

Magnitude. In Maids and Old Women long paſt their *Menſes*, it is pretty near of a Size.

It is divided by Anatomiſts, as all other Cavities of this kind are, into the *Fundus* and *Cervix*: A broad Part, and a Neck: And is in Extent from the Extremity of one, to that of the other, about three Inches in length. Its breadth at the *Fundus* is about two and an half, and its thickneſs two.

Cervix. Fundus.

Tab. ib. Fig. iii.

It has but one *Cavity*, unleſs we make a diſtinction between the Cavity of the *Uterus*, and that of its *Cervix* or Neck. That of the *Fundus* is very ſmall, ſcarce ſufficient to contain a Garden-Bean. At the bottom, or Neck, it grows exceſſive narrow in Virgins, unleſs at the time of Purgation, ſcarce wide enough to admit a *Crows-Quill*: The Extremity of which Paſſage, is call'd the *Oſculum Internum*. In Pregnant Women it opens more eſpecially towards the time of Delivery. But to obviate the Inconveniencies that might happen by the Wombs remaining open, it is, as it were, ſeal'd up with a ſort of Glutinous Matter, that iſſues from the Glands about it.

Cavity.

The lower *Orifice* of the *Neck*, looking towards the *Vagina*, is a little prominent, and reſembles, in ſome meaſure, the *Glans* of the *Virile Organ*. The Subſtance of it appears to be very firm and compact, yet is never the leſs dilatable to a great degree,

Orifice *of the* Neck.

Tab. ib. Fig. ii.

as appears by the Excluſion of a full grown *Fœtus.*

Sub-ſtance *of the* Uterus.

The *Subſtance* of the *Uterus* is Membranous and Carnous. It conſiſts of three *Tunics*, or according to ſome, who deny that Name to the middle Subſtance, of two only.

External Tunic.

The *External Tunic*, which is call'd the *Communis*, is deriv'd from the *Peritonæum.* This conſiſts of two *Lamellæ*, and is pretty thick and ſtrong. The Exterior of theſe is ſmooth, the Interior ſomewhat rugged, and uneven, through the Connexion of the ſubjacent Parts. This Membrane inveſts the whole Womb, and connects it to the *Inteſtinum Rectum*, Bladder of Urine, and other adjacent Parts.

Middle Tunic.

The *Middle Tunic* is very thick, and is compos'd of thick ſtrong Fibres variouſly diſpos'd. It ſeems to be Muſcular, and is by ſome thought to contribute to the Excluſion of the *Fœtus*, and other Contents of the Womb. Tho', in my Opinion, that is not the Office of it, and this, as the Muſcular Membranes of other Parts, ſerves only to recover the Tone after any violent Diſtenſion.

Inward Tunic.

The *Inner Tunic* is *Nervous.* It is thin, and in the *Fundus Uteri* ſmooth, but in and about the Neck very much wrinkled, and pierc'd with abundance of little Holes, like the Mouths of Ducts, out of which, upon preſſing, iſſues a clear, ropy Liquor, which probably is that which ſeals up the Mouth of the Womb, in the time of *Geſtation.*

Connexion.

The *Uterus* is *connected* by its Neck to the *Vagina*, behind by its outward common Membrane, and before by the ſame to the *Veſica Urinaria.* Its ſides are ty'd to other parts, but the *Fundus* of it is left looſe, that it may expand and dilate with more freedom, according to particular Exigencies.

Ligaments.

The *Ligaments* are in Number four, two of them call'd the *Broad* Ligaments, and two *Round* from their Figure.

Broad Ligaments.

Tab. ix. Fig. I.

The *Broad Ligaments* are Membranous, and ariſe from the *Proceſſus* of the *Peritonæum*, from which they branch off about the Loins, and are faſtned to the ſides of the *Uterus* and *Vagina*, and ſerve to prevent their falling down. They contribute likewiſe towards the ſuſtaining the *Ovaria*, the *Tubæ Fallopianæ*, and other Veſſels, which they, as it were, embrace.

Round Ligaments.

Tab. ib.

The *Round Ligaments* ariſe from the ſides of the Womb, at the place where the *Tubæ Fallopianæ* are joyn'd to it. At their firſt riſe they likewiſe are broad, but by degrees, as they recede farther from the Womb, they grow round and ſmooth. And as the Spermatick Veſſels do in Men, paſs betwixt the Duplicature of the *Peritonæum*, and ſo out of the *Abdomen* through the *Foramina* of the Oblique and Tranſverſe Muſcles of the *Abdomen*, then running obliquely upon the *Os Pubis*, they there terminate under the Fat near the *Clitoris*. By the Paſſages of theſe Ligaments, Women and Girls eſpecially are expos'd to Inguinal Ruptures, as Men are by the Paſſages of the Spermatick Veſſels.

Subſtance *of the* Ligaments.

Broad.

Tab. viii & x.

The *Subſtance* of the Broad-Ligaments is Membranous, looſe and ſoft, whence they have been compar'd by ſome to the Wings of *Bats*, and call'd *Alæ Veſpertilionum*; and from the Intertexture of ſome Fibres, others have miſtakenly fancy'd them to be *Muſcles*. After hard Labour, and a forc'd Delivery, theſe Ligaments are ſometimes over-ſtrain'd ſo far, as not to recover their Tone, whence follows a Propendence at the *Pudendum*, which is term'd *Prolapſus Uteri*. But whether properly ſo call'd, and that Appearance be a real *Prolapſus* of the *Uterus*, or only a Dilatation, and Propendence of the *Vagina* only, as ſome would have it, is an enquiry not of this place.

Round.

Tab. x.

The *Round Ligaments* are of a firmer Texture, and conſiſt of a double Membrane, wrapping up in it *Arteries*, *Veins*, *Nerves* and *Lymphæducts*, intermix'd with Fleſhy Fibres, whence ſome have miſtaken theſe alſo for Muſcles. The Blood-Veſſels and Nerves, both in theſe and the Broad Ligaments, are numerous, and make up a great Part of what is call'd their Subſtance. Theſe, as the others, ſerve to keep the Womb in its right Poſition, and are capable of being injur'd, by the Violence of Unskilful Midwives, in haſty, forc'd Deliveries.

Hyſterick Paſſions.

By theſe Ligaments the *Uterus* is kept ſo tight in its proper Situation, that no Violence of internal *Flatus* or Humours, can raiſe it above its place. For as *De Graaf* obſerves, a Man pulling with both Hands, with all his Strength, cannot raiſe it above the *Os Sacrum.* This makes appear the Vanity of that Opinion which ſome have maintain'd after the great *Hippocrates:* That in *Hyſterick Paſſions*, as they are improperly call'd, the *Uterus* riſes, and preſſing upon the *Stomach* and *Diaphragm* cauſes that Senſe of *Suffocation* which Women feel in ſuch Affections: An Error pardonable in the Times of that great Philoſopher, when Anatomy was but rude, but not to be forgiven in Modern Phyſicians, who have the Means of knowing at the Expence of others Labour, (if they would take the Pains to read,) the Abſurdity and Impoſſibility of that Notion.

Tubæ Fallopianæ. Tab. viii, ix, x.

On each ſide of the *Fundus* of the Womb ariſes a *Duct*, which opens into the Womb with a very ſmall Orifice, ſcarce admitting a ſmall Stile, or a Knitting-Needle, but in its Progreſs its Capacity grows greater, being large enough to admit the end of a Man's little Finger, and towards the end is contracted, and grows ſmall again. At the end next the *Ovaria*, which is at liberty, it is again expanded into a ſort of *Foliage*, which is fring'd round with innumerable little Fibres, like a ragged Fringe, which Expanſion, when open'd, was thought, by *Fallopius* the firſt Deſcriber, to reſemble the end of a Trumpet, and therefore the whole Duct was by him nam'd *Tuba*.

Expanſum Foliaceum.

Membranes.

It conſiſts of a double *Membrane*, the outward ſmooth and even, deriv'd from the common Membrane of the *Uterus*. The Inner, which ſprings from the inner Membrane of the Womb, is very much corrugated, more eſpecially at the Extremities. That fartheſt from the Womb at the time of Impregnation, at which time the whole *Tube* is expanded, reaches to, and embraces the *Ovary:* At other times it ſeems to fall a little ſhort of it, and is only ſlightly ty'd by a thin Membrane, reaching from the under part of the *Expanſum Foliaceum*, to the under ſide of the *Ovary*. Theſe *Tubes* are about five or ſix Fingers breadth long.

Both *Arteries* and *Veins* are very numerous here, eſpecially the latter, which by their Ramifications and Contortions make the main Subſtance of them, which is a kind of *Reticular* or *Cavernous* Body, conſiſting almoſt wholly of Blood-Veſſels, not unlike that of the *Pudendum*, or *Clitoris*, before deſcrib'd. This Structure makes it capable of Dilatation and Contraction, according to the Quantity and Stop of the Irruent Blood, and conſequently of being Erected (if I may uſe that Term) *in Coitu*, and of embracing the *Ovarium* at that time, which in its State of Flaccidity it did not reach. Structure Tab. x. Fig. ii.

Dr. *Wharton* has aſcrib'd *Valves* to them, and others have divided them into *Cells*: But tho' both are to be found in the *Cornua Uteri* of ſome Brutes, they are not to be met with in the *Tubes* of Women, which have but one Cavity a little dilated in the middle, and no *Valves*. *No* Valves, *nor* Cells.

Near the ends of theſe *Tubes*, about two Fingers diſtance from the *Uterus*, lie the *Ovaries*, or *Teſtes Muliebres*, ſo call'd from their Uſe, which was formerly ſuppos'd to be analogous to that of the Teſticles in Men. Ovaria. Tab. x.

They are connected to the Womb by a ſtrong Ligament, call'd by many Anatomiſts *Vas Deferens*, upon Suppoſition that it was a Veſſel which convey'd the Seed to the Womb, and in ſome meaſure likewiſe by the Connection.

the *Tubæ Fallopianæ*, and by the *Broad Ligament*. About the Region of the *Os Ilium*, they are faſten'd to the *Peritonæum* by means of the Spermatick Veſſels, and the Membranes which cover them, by all which the *Ovaries* are kept ſuſpended about the ſame height with the *Fundus Uteri* in Women not Pregnant. In Pregnants they riſe along with the *Uterus*, but not quite ſo high as that does in the laſt Months of Geſtation.

Figure. Their *Figure* is not ſo round as the Male *Teſtes*, but is a kind of Semi-oval: Gibbous on one ſide, and depreſs'd on the other, with a Superficies ſomething uneven, through the unequal Protuberance of the *Ova* which they contain.

Magnitude. They are of different *Magnitudes* in the different Stages of Life. At the time of *Puberty*, when they are at their largeſt, they weigh ordinarily about a Dram and an half, and are about half the bigneſs of a Man's Teſticle. In the Flower of Age they are Plump and Succulent, but as Age comes on, they wither and ſhrink by degrees, and grow hard and dry, ſo as ſometimes at laſt to weigh not above a Scruple. Some Anatomiſts have affirm'd, that theſe, as Glandulous Parts, like the *Thymus*, were bigger in Infants, and decreaſe gradually after Birth; but *De Graaf*, who weigh'd many of thoſe of new-born Children, ſays, he never found them weigh otherwiſe than between five and ten Grains.

Membrane. They are cover'd externally with a common *Membrane* from the *Peritonæum*, to which ſome add a proper *Membrane*.

Subſtance The Membrane being taken away, the *Subſtance* appears whitiſh, compos'd of a multitude of thin little Membranes, and ſlender Fibres, interwoven with a great Number of *Arteries*, *Veins* and *Nerves*.

Ova. Tab. x. Fig. i. N. Among theſe Fibres, Membranes and Veſſels, are found interſpers'd a number of little round Bodies, like Bladders, full of a limpid Subſtance like the White of an Egg, which boyl'd acquire the ſame Colour, Taſte, and Conſiſtence, with a boyl'd White of an Egg, from which Similitude, as well as from the Analogy of their Uſe, (being taken for the material Principle of Generation,) they are now commonly call'd *Ova* or Eggs, and the *Teſtes* in which they are contain'd *Ovaries*.

Magnitude. Theſe *Eggs* are of very different *Magnitudes* in the ſame *Ovary*, tho' the biggeſt in a Woman ſeldom equals the ſize of a white Pea. They are ſo numerous, that *De Graaf* has told above twenty in one *Ovary*. Theſe Eggs have been found by Anatomiſts in the *Ovaries* of almoſt all ſorts of Animals, and are not doubted to exiſt in the Females of all ſorts of Animals whatſoever.

Beſides

Hydatides. Vide Tab. ix. Fig. i. e.

Beſides theſe Eggs, there are ſometimes found another ſort of watry Bladders, which are ſuppos'd to be preternaturally there, becauſe they are found but now and then, and ſometimes bigger than the *Eggs* themſelves. Theſe are call'd *Hydatides*, and are probably the beginning of a *Dropſy*, commenc'd in this Part by the *Eggs*, and perhaps are no other than the *Hydropical Eggs* themſelves.

An Hydropical Diſſection.

It is not unlikely that all thoſe *Dropſies* of the Belly which Women labour with under the fallacious Name of *Tympanies*, have their firſt riſe in theſe Parts. I have been preſent at the opening of ſeveral, and have always found the *Ovaria* diſtended with Water to an incredible Magnitude (tho' not always equally on either ſide) but eſpecially in one, when a Gallon or more of Water was taken out of one *Teſticle*, and the Membranes of the *Teſticles*, after the Water taken out, ſo enlarg'd and thicken'd, that it appear'd by Hand to weigh ſome Pounds, but not having weigh'd it in *Scales*, we cannot tell the exact weight of it.

Blood-Veſſels. Superior. Tab. viii, ix, x. Fig. i.

The *Blood-Veſſels* that go to the *Uterus*, and the appending Parts, are divided into Superior and Inferior. The SUPERIOR are the ſame that are call'd in Men the *Spermaticæ*, and *Vaſa Præparantia*, and have their Origines from, and *Exit* into the

Aorta and *Cava*, as the Veſſels of Men have. But not being ſent out of the *Abdomen*, their courſe is ſhorter. The Branches which they diſtribute into the *Uterus* and *Vagina*, are larger and more in number, than thoſe that go to the *Tubæ Fallopianæ* and *Ovaria*.

The INFERIOR are Branches of the *Hypogaſtricks* and *Hæmorrhoidals*, and only ſcatter themſelves upon the lower part of the *Vagina*. Thoſe before mention'd are pretty large, and are diſtributed all over the *Vagina* and *Uterus*, running after an irregular manner with abundance of Contortions; and joyning very apparently by perfect *Anaſtomoſes*, *Arteries* with *Arteries*, and *Veins* with *Veins*, as blowing into them, or Injections with any Liquor ſhew, eſpecially the Injections of Wax.

Inferior.
Tab. x.
Fig. i.

But in the times of Geſtation theſe Veſſels grow very large, and plainly ſhew, even without Injection, their Communication; ſome of them being large enough to admit of a Swans Quill.

Diſtended in the time of Geſtation.
Tab. viii, x.
Fig. i.

They receive *Nerves* from the *Par Vagum*, and from the *Cauda Equina* in the *Os Sacrum*.

Nerves.

Monſieur *Nuck* has given us an Accurate Deſcription of the *Lymphæducts* of the *Ovaria*, in his *Adenographia Curioſa & Uteri Fæminei Anatome Nova*: They ariſe

Lymphæducts.

ariſe from the Surface of the *Ovaria* by ſeveral Branches, which unite and make three Branches on each ſide, and partly empty themſelves into the *Lymphatick Glands* below the *Emulgent Veſſels*, whence other exporting *Lymphæducts* ariſe, and empty themſelves into the *Receptaculum Chyli*; others empty themſelves immediately into the *Receptaculum*.

TAB. IX.

FIG. I.

From *Swammerdam*.

SHews the *Uterus* of a *Virgin*.

AA, The *Spermatick Veſſels* from their Riſe to their Diſſemination through the *Ovaria*, *Tubes* and *Fundus Uteri*.

BB, The *Corpus Pyramidale* on each ſide compos'd of Branches of the *Spermatick Artery* and *Vein*.

C, The left *Teſticle* or *Ovary* cover'd with its proper Membrane, through which Eggs appear protuberant.

D, The Diſtribution of the *Spermatick Artery* and *Vein* upon the left *Ovary*.

EEEE, The Branches of the ſame Veſſels marching over the *Membranous Ligaments*, or *Alæ Veſpertilionum*, to the *Tubæ* on each ſide.

FFFF, The *Spermatick* and *Hypogaſtrick* Veſſels, which run curling together along the ſides of the *Neck* of the *Uterus* under the *Tubes* and *Round Ligaments*, and inoſculate freely on each ſide.

GG, The *Hypogaſtrick Veins*.

HH, The *Hypogaſtrick Arteries*.

IIII, The *Anaſtomoſes* of the Arteries expreſs'd.

KKK, The various *Implications* and numerous *Inoſculations* of the Veſſels finely expreſs'd.

LL, The left *Tube* or *Horn* of the *Womb*.

M, The *Aperture* of the *Tube* diſplay'd with its Fringe reſembling the tatter'd edges of a worn Cloth.

N, The *Membrane* of the *Teſtis* ſeparated, and turn'd back to ſhew the *Ova* and the *Spermatick Veſſels* going to and from them.

O, The right *Tube* inverted to ſhew its Capacity through which the *Ova* deſcend to the *Uterus*.

P, The Fringe of the right *Tube*.

Q, The *Fundus* of the Womb obſcurely protuberant.

R, A *Slit* in the Body of the Womb.

S, The *Subſtance* of the Womb, in which appear the *Orifices* of the *Blood-Veſſels* cut tranſverſly.

T, Part of the *Membrane* covering the *Inteſtinum Rectum.*

V V, The *Round Ligaments*, which are nothing but the *Arteries* and *Veins* which go to the *Clitoris* and *Pubes*, wrapp'd up in their proper *Involucrum* or *Tunic.*

XX, *Crura Clitoridis*, or its Divarications, call'd by *Swammerdam Crura Externa.*

YY, The *Cavernous* Bodies of the *Uterus* taken notice of by *De Graaf* under the name of *Plexus Reticularis*, but here call'd *Crura Clitoridis Interna.*

ZZ, The Veſſels of the *Clitoris:*

a, The *Bladder* of *Urine* turn'd toward the right ſide.

B, The Inſertion of the Neck of the *Bladder* near the *Clitoris.*

CCCCCC, The *Ureters.*

dd, The Inſertion of the *Ureters* into the *Bladder.*

ee, A *Hydatis.*

ff, The *Valves* of the *Veins.*

FIG. II.

A, THE Body of the *Clitoris* diſtended with Wind, as it is with Blood *in Coitu:*

BB, Its *Crura* alſo diſtended.

CC, The Extremities of the *Corpora Cavernoſa* of its *Crura* cut from the *Oſſa Pubis.*

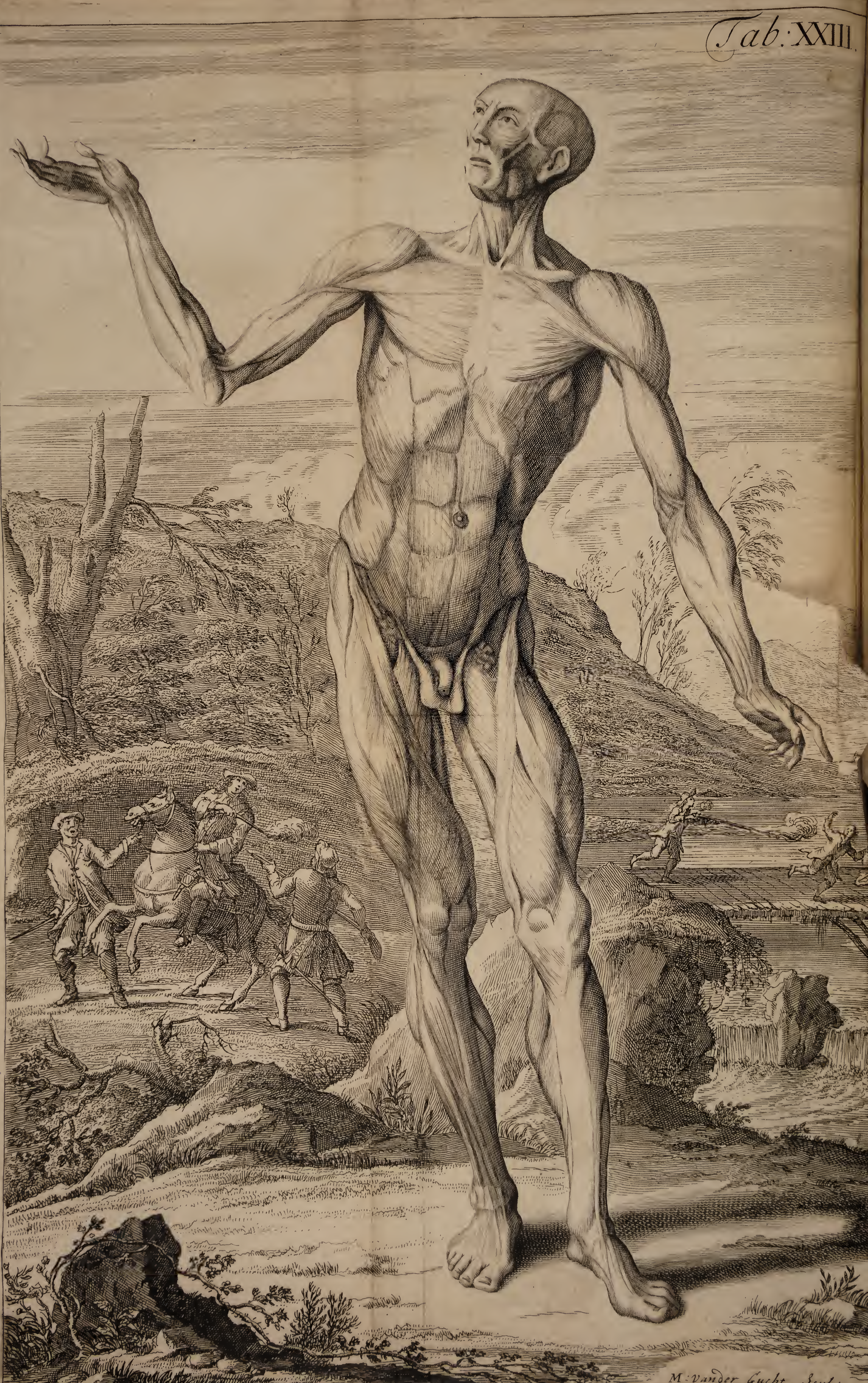
DD, The *Muſculi Erectores Clitoridis* freed from the *Oſſa Coxendicis*, and left at their Terminations.

EE, The *Arteries.*

F, The great Vein.

GG, The Nerves of the *Clitoris*, which paſs likewiſe to the *Corpus Cavernoſum Pudendi.*

HH, The *Corpus Cavernoſum Pudendi* inflated by the Veins of the *Clitoris* F.



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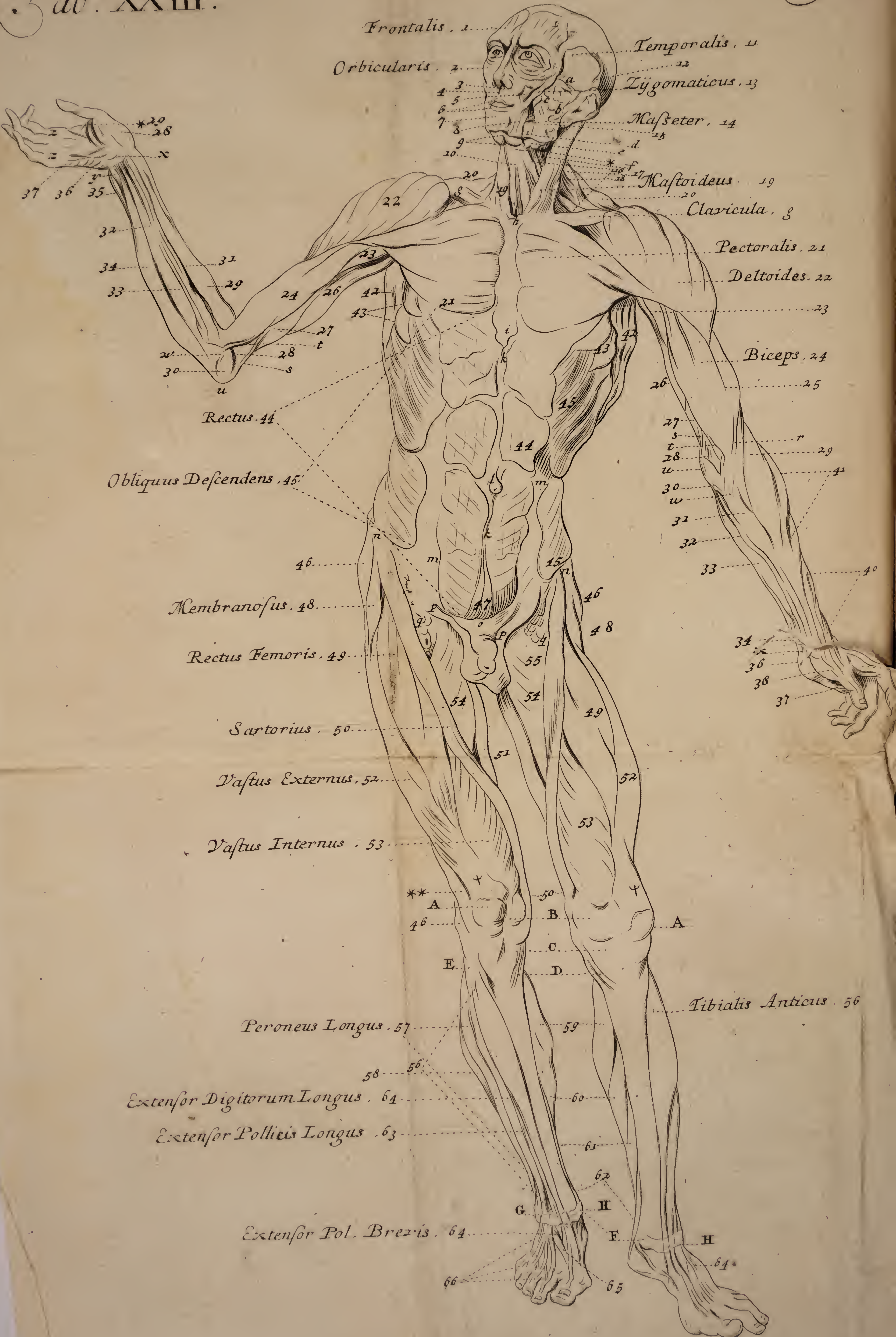
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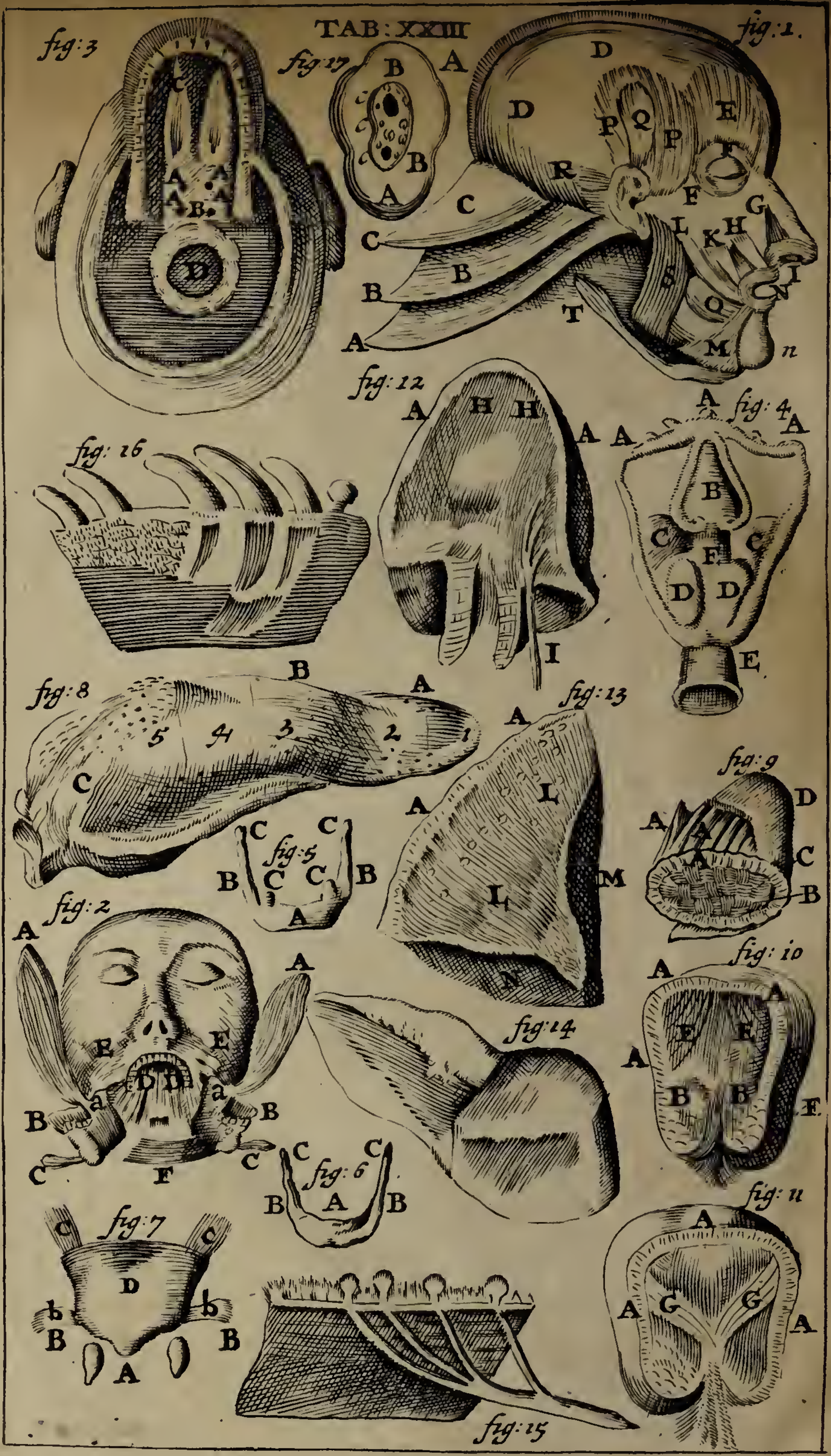
TAB: XXIII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CHAP. XXIII.

Of the Placenta Uterina, *The* Umbilical Veſſels, *The* Membranes *that involve the* Fœtus, *and the* Liquors *that they contain, The* Situation *of the* Fœtus *in the* Womb, *The* Legitimate Time, *The* Nouriſhment *of the* Fœtus, *The Difference between a* Fœtus *before* Birth *and after.*

SYLLABUS.

Eorum quæ conſpiciuntur in ſolis GRAVIDIS *&* FOETU.

- *Quæ ſunt*
  - *Vel Utrique Communia*
    - *Placenta*
      - *Magnitudo*
      - *Figura*
      - *Connexio*
      - *Subſtantia*
      - *Numerus in* —
        - *Mulieribus*
        - *Brutis*
    - *Vaſa Umbilicalia*
      - *Arteriæ*
        - *Nodi ſeu*
        - *Contorſiones*
      - *Vena*
        - *Bifurcatio & Reunio*
      - *Urachus*
    - *Membranæ*
      - *Chorion* — *Lamellæ*
      - *Urinaria Needhami*
      - *Amnios*
    - *Partus*
      - *Ordinarius*
      - *Rariores*
      - *Cæſareus*
      - *Tempeſtivus*
      - *Abortus*
  - *Vel Fœtui Peculiaria*
    - *Situs*
    - *Canalis Venoſus*
    - *Foramen Ovale*
    - *Canalis Arterioſus*
    - *Pulmonum*
      - *Color*
      - *Conſiſtentia*
    - *Magnitudo*
      - *Capitis*
      - *Cerebri*
      - *Thymi*
      - *Glandularum omnium*
    - *Oſſium Teneritudo*
    - *Cranii Suturæ Apertæ*

After *Impregnation* there is a new Production of Parts, that exiſt only during the time of *Geſtation*, and afterwards are either diſcharg'd, or dry up and diſappear.

Of theſe the *Principal* is the *Fœtus*, for the ſake and uſe of which, all the reſt are ſorm'd. But of that more hereafter.

After the *Fœtus*, the moſt conſiderable Placenta. for Bulk and Figure is the PLACENTA, by ancient Anatomiſts call'd *Hepar Uterinum*, for Reaſons, which ſince the Diſcovery of the *Circulation* of the Blood, are out of date. It is ſomething in Figure like a Plate without Brims, about three quarters of a Foot over, ſometimes a Foot. It is round generally, of a Figure *Concave-Convex*. The Concave ſide adheres to the *Uterus*, and is uneven, with divers Protuberances and Pits, by which it made Impreſſions upon, and receiv'd them from the *Uterus*. The Place of it in the *Uterus*, whatever ſome pretend, is not certain.

Number. In *Women*, unleſs in caſe of *Twins*, or more, there is but one: However the Number generally anſwers the Number of the *Fœtus*. In ſome Brutes, eſpecially in *Oxen* or *Sheep*, they are very numerous, ſometimes near an hundred, even for one *Fœtus*. ſmall, and reſemble pretty large conglomerate Glands.

From the External or Concave ſide, which likewiſe has its Protuberances, tho' cover'd with a ſmooth Membrane, iſſue the UMBILICAL VESSELS, which are in great Plenty diſtributed through the whole Subſtance of it. Unbilical Veſſels.

The *Umbilical Veſſels* are two *Arteries* a *Vein*, and the *Urachus*.

The ARTERIES ariſe from the *Iliacks*, generally near their diviſion into External and Internal, and thence paſs on each ſide of the *Urinary* Bladder through the *Navel* to the *Placenta*. Arteries.

The *Umbilical Vein*, from innumerable Capillars united into one Trunk, deſcends from the *Placenta* to the Liver of the *Fœtus*, where it is partly diſtributed into the *Porta*, and partly into the *Cava*. The Trunk of this *Vein*, anſwerable to the occaſion, is above double the Capacity of either *Artery*. It is ſometimes divided before it comes at the *Fœtus* into two Branches, and united again within. Vein.

The *Arteries* have in ſeveral places Contortions or Convolutions, which form a ſort of Knots, by the number of which, our *Midwives* ſuperſtitiouſly reckon the Number of Children the Woman is to have.

Among theſe *Umbilical Veſſels* may be reckon'd the URACHUS, which, tho' not plainly found, except in *Brutes*, where it is indiſputable, is in my Opinion however Urachus.

reaſonably to be allow'd, tho' our Opportunities of Examination not being the ſame, it uſually collapſes, and grows ſo ſtiff before ſuch Subjects come under our Examination, that we have not a fair Tryal: But the Neceſſity appearing to be the ſame, I can little more doubt the Exiſtence of it, than in *Brutes*, where it is exhibited beyond contradiction.

Membranes *of the* Fœtus

To theſe Veſſels are continued the *Membranes* which include the *Fœtus*, the Interior of which including the *Fœtus*, and the Liquor wherein it lies, is call'd *Amnios*, which is a white, ſoft, thin, tranſparent Membrane, containing in it a limpid Liquor, like a thin Gelly Broth; of which the Stomach of the *Fœtus* being always found full, it is probably, in part at leaſt, the Matter of its Nouriſhment.

Membrana Urinaria.

On the outſide of this is found a thin Humour, that in Conſiſtence, and other Circumſtances reſembles Urine, which, according to Dr. *Needham*, is contain'd in a proper *Membrane*, which he calls *Membrana Urinaria*, and receives the diſcharge of that Liquor from the *Urachus*. But, Subjects proper for an Examination of this Particular being rare, Anatomiſts have doubted the Exiſtence of this Membrane, and have choſen rather to make it a Duplicature only of the *Chorion*, and to leave the Liquor which it contains (which is no ſmall quantity)

tity) unaccounted for, than to allow any thing analogous to the *Allantois* in Cows and Sheep, tho' the neceſſity appears to be the ſame. For this they give no other reaſon, than that the *Vrachus* of a Humane *Fœtus* is not permeable by the *Flatus*, and that the Membrane, which Dr. *Needham* calls *Vrinaria*, adheres in ſome places pretty cloſely to the *Chorion*. The firſt of which may happen generally, becauſe ſuch Subjects are not expos'd time enough to them to make a fair Inquiry. The latter carries no weight at all with it.

Chorion.

The outward *Membrane* of the CHORION, is a pretty thick, ſtrong, whitiſh Membrane cover'd with a multitude of Branches of Veins and Arteries. It is diviſible into two *Lamellæ*, whereof the outermoſt is thick and opake, the inner thin and tranſparent. Thoſe that deny the *Vrinary Membrane* divide it into three. The innermoſt of which is as the outer, likewiſe pretty thick, contrary to the common Courſe of Nature, which is ſome Argument for its being a diſtinct Membrane.

Situation *of the* Fœtus.

Some Anatomiſts have pretended to give an account of the Poſture of the *Fœtus* in the Womb at the ſeveral times of Geſtation. But theſe are ſo very various and uncertain, that ſuch accounts are little to be depended upon. In the firſt Months, it is of no moment how it lies in the Womb, in the latter Months after the *Fœtus* is grown not only Quick, but Robuſt, it frequently changes its Poſtures of it ſelf, as not only the Mothers themſelves feel, but any Body, by laying their Hands upon their Bellies, frequently may. However, their ordinary Poſture is accounted to be ſitting, with the Head uppermoſt, the Knees brought up between the Elbows, the Feet drawn back towards the Buttocks, the Hands clos'd below the Knees, and the Head dropping, with the Noſe, as it were, between the Knees.

Birth.

When the time of *Birth* draws very near, it generally turns it ſelf, and, preſerving as to the reſt near the ſame Poſture, preſents the Head to the *Os Vteri*, which is the moſt eaſie and natural Poſture for *Delivery*. When the *Midwives* find it thus offering, they ſay it lies right. Sometimes it preſents the *Feet* firſt, and this way Women are deliver'd, but with great Difficulty and Pain. Sometimes likewiſe it lies a-croſs, offering either a *Hand*, a *Foot*, a *Knee*, or an *Elbow*, and this way *Delivery* is impracticable, and unleſs the *Midwiſe* has the Addreſs and Skill to turn it, as they boaſt that they do ſometimes, either Mother or Child, or both, muſt be loſt. In this deplorable Caſe, the Life of the Mother is generally preferr'd to that of the Child, and the Child, by means of Inſtruments, has been brought away by Piece-meal.

Delivery *through an* Apoſtemation.

Sometimes the Child dies in the Womb, which if not timely diſcover'd, and brought away, the Mother runs great hazard. This ſort of *Births* is not inconſiſtent with the ſafety of the Mother. *Bartholin* in a Book *De Inſolitis Partus Viis* relates a great many ſtupendious Caſes of Children dead and putrify'd in the Womb, the Parts of which have made their way through *Apoſtemations*, one whereof at the *Navel* was ſome Years in coming away, ſome Bones being diſcharg'd at long diſtant times, and making up in all, as he judges, ſufficient for the *Sceleton* of *Twins*.

A putrefy'd Fœtus, *and a living one, kept together ſome Months in the Womb.*

Something like this happen'd to a *Gentlewoman* of my Acquaintance, who receiving a great Fright after ſhe was twenty Weeks gone with *Twins*, found her Belly inſenſibly to begin to ſink on one ſide, and at length to grow very cold, flaccid, and flat, whilſt the other ſide continued to ſwell and increaſe, till the due time of Delivery, when ſhe was deliver'd of a Live Child. With it came away abundance of fœtid, putrify'd, black, and other colour'd Matter mix'd with the Bones of a Child, which dy'd at the time of that Fright, and remain'd corrupting in the Womb, till the time of Delivery. The *Placenta* of the

Child which was born alive, was very black, diſcolour'd, and in ſome meaſure putreſy'd likewiſe. The Child however grew up to be a Woman, and is now alive and bears Children, but has been from her Cradle obnoxious to *Scrofulous Tumours*, *Ulcerations*, *Cutaneous Eruptions* and *Swellings*. It is probable the Infirmity, to which this *Gentlewoman* is obnoxious, is owing to a Taint receiv'd from that unhappy *Bedfellow* in the Womb.

Partus Cæſareus It happens ſometimes likewiſe that the Mother dies the Child yet living and vigorous in the Womb. In this Caſe without Scruple or Delay the Womb is to be cut open, by which means the Life of many Children has been ſav'd, and ſome not yet come to Maturity for a *Natural Birth*. This way our *Edward* the *Sixth* was brought into the World, and *Julius Cæſar*, from whom it has been ever ſince call'd *Partus Cæſareus*.

Time. The *Legitimate Time* of the *Birth* has been much controverted, tho' common Obſervation ſhews it to be about Forty Weeks from the *Time* of *Impregnation*, and tho' very frequent Inſtances of thoſe that go longer, or come ſooner are pretended, yet I believe this to proceed rather from the miſtaken Accounts of the Women themſelves, than from any Variation in Nature. We do indeed not only read of, but frequently ſee Births of *Seven* and *Eight* Months, but theſe may be reckon'd among the untimely *Deliveries*, and the Child is ſeldom or never Mature, if there has been no Fallacy in the Reckoning. All Creatures have a ſtated Period for bringing their Young into the World at Maturity, and why it ſhould be otherwiſe in Women, no Reaſon appears.

Nouriſhment *of the* Fœtus

How the *Fœtus* is *Nouriſh'd* in the Womb, has been a Queſtion as much agitated among Anatomiſts as any whatſoever. Some contend that it is nouriſh'd by the Mouth, others will have it to receive its increaſe, and to grow like a *Vegetable* from the Mother, as from the Root, of which the *Umbilical Veſſels* are the Stem, and the Child the Head, or Fruit of this *Plant-Animal*, if I may uſe that Expreſſion. But this Queſtion, and ſome others, we ſhall wave here, as containing ſomething of curious Argument, and deſerving a more particular Diſcuſſion.

Difference *of the* Fœtus *before and after* Birth.

There are ſome *Differences* in the *Structure*, *Mechaniſm* and *Proportion* of the *Parts* of a *Fœtus*, from thoſe of an *Adult*, of which the Principal are thoſe about the *Umbilical Veſſels* and *Liver*, and thoſe about the *Heart* and *Lungs*. The moſt apparent of theſe, is the *Funiculus Umbilicalis*, which is a Part that at the Birth is either broken, or cut away to the *Navel*. Here are two *Arteries*,

Arteries, and a *Vein* and *Urachus*, which after Birth, become perfectly uſeleſs as Veſſels, and drying, become impervious, and ſerve only as *Ligaments* to ſuſpend the *Liver*.

Canalis Venoſus. In the Liver it ſelf is the *Canalis Venoſus*, which in a *Fœtus* maintains a Communication between the *Porta* and *Cava*, but after Birth dries up by degrees.

Foramen Ovale, Canalis, Arterioſus. In, and at the *Heart*, are the *Foramen Ovale*, and *Canalis Arterioſus*, both which ſerve to maintain the *Circulation* of the Blood, and to divert it from the Lungs, which in a *Fœtus* are idle and uſeleſs, and of a darker Colour, and cloſer Conſiſtence, than after they have been breath'd into, as appears by their ſwimming in Water after Birth, which they will not before do. This difference in the Lungs, affords an uſeful Experiment, in caſe of the ſuſpected *Murther* of *Children*, for if they were *Still-born*, the Lungs ſink in Water; If born alive, they ſwim. The afore-nam'd Channels ſerve only for the uſe of a *Fœtus*, to prevent that Obſtruction the Blood would otherwiſe have within the Lungs before they have been open'd. After Breathing has open'd the Lungs, the Blood takes its courſe through them, and theſe Paſſages cloſe up.

Head. The *Head* is much bigger in Proportion to the reſt of the Body than afterwards;

The *Bones* are ſofter, and the *Sutures* unclos'd, leaving a great Space on the top of the *Head*, cover'd only with the *Membrane*, which is afterwards clos'd up with the *Bones*.

The *Thymus*, and *Glandulæ Renales* are conſiderably larger than afterwards, for it does not increaſe in Proportion to the Age of the Perſon.

Thymus, Glandulæ Renales.

Moſt other *Glands* are likewiſe bigger and ſofter, as the *Brain* it ſelf is.

Brain.

There are other Differences which are of no great moment,and therefore not neceſſary to be mention'd here.

TAB. X.

FIG. I.

From *Swammerdam.*

SHews the Back Proſpect of the *Uterus* of a Woman after Delivery.

AA, The *Spermatick Arteries.*

BB, The *Spermatick Veins*, which after ſending a number of Branches to the *Ovaria* and *Fallopian Tubes*, have divers notable *Anaſtomoſes* with the *Hypogaſtrick Arteries* and *Veins* about the *Neck* of the *Uterus.*

CC, The *Arteries* and *Veins* that form on each ſide the *Corpus Pyramidale.*

D, The Left *Teſtis* or *Ovarium* cover'd with its proper *Membrane.*

E, The Proper *Membrane* of the Right *Ovarium* open'd and expanded to ſhew the Diſtribution of *Arteries* into the *Ova*, of which a few only of the leaſt are here figur'd, that they may appear more diſtinct.

F F, The *Membranous* or *Broad Ligaments* of the *Womb*, call'd *Alæ Veſpertilionum*, which the *Spermatick Veſſels* traverſe in their way to the *Tubes.*

G G, The *Cornua*, or *Tubæ Uteri* reaching from the *Fundus* of the *Matrix* to the *Ovaria*, and ſerving for the Conveyance of the *Ova* from thence to the *Uterus.*

H H, The *Round Ligaments* of the *Womb* on each ſide.

I, The *Riſe* of the *Arteries* and *Veins* of the *Round Ligaments* on the Left ſide.

K, A *Valve.*

L L, The two *Hypogaſtrick Arteries.*

MM, The *Hypogaſtrick Veins.*

N, The Body, or *Fundus Uteri.*

O, The *Neck* of the *Uterus.*

PPP, The *Arteries* on the *Body* of the *Uterus* turn'd ſpirally like the Tendrils of a Vine.

QQ, Numerous *Veins* of the *Uterus* appearing prominent through the Exterior Membrane, and ſhewing divers *Anaſtomoſes* ſcatter'd up and down.

RR, The *Vulva*, or *Vagina Uteri* reaching from the outward *Oſtium* of the *Pudendum* to the inward one of the *Matrix.*

S S, The *Urethra*, or *Proper Channel* of the *Urine* cut off near the *Pudendum* together with the *Vagina.*

T T, The lower Surface of the *Bladder* of *Urine.*

V V, The *Ureters* deſcending to the *Bladder.*

Y, A piece of the *Urachus.*

ZZ, The *Umbilical Arteries.*

F I G. II.

ONE of the *Fallopian Tubes* with its *Blood-Veſſels* fill'd with Quickſilver and Wind, to ſhew *their* Progreſs on one of the *Alæ Veſpertilionum*, with the *Reticular* diſtribution of the *Veins* on the *Parietes* of the *Tube* and its *Foliated Expanſion*; whereby theſe parts become diſtended, and are render'd capable each of embracing the *Ovarium* on their own ſide, in order to convey the *Semen Maſculinum* from the *Uterus*, as well as to tranſmit the *Impregnated Ovum* afterwards to its *Fundus.*

A, That part of the *Tube* next the *Uterus.*

B, Its other Extremity, which is a little contracted before it makes its *Foliated Expanſions.*

CC, Its *Foliated Expanſions* here diſtended with Wind, as they are with Blood *in Coitu.*

D, The Orifice at the Extremity of the *Tube* dilated.

E, One of the *Alæ Veſpertilionum* with its

F, *Veins* and *Arteries* continued from the *Hypogaſtricks* of the *Uterus*; the former, *i. e.*

G, The *Veins* making a *Cavernous* or *Reticulated Body* on the ſides of the *Tube.*

TAB:XXIV.

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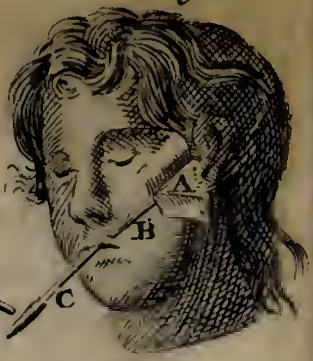

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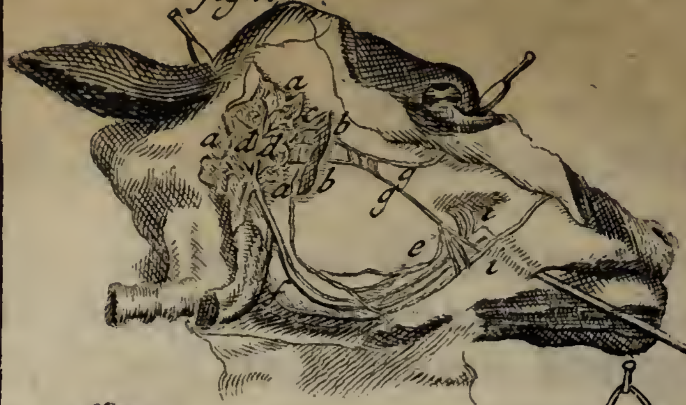

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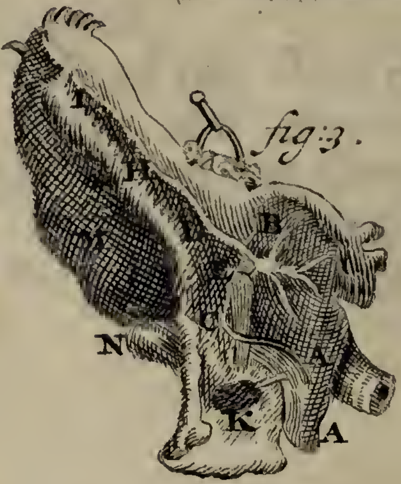

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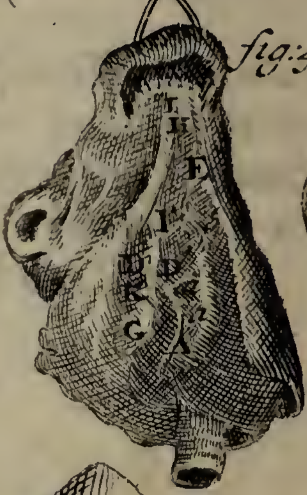

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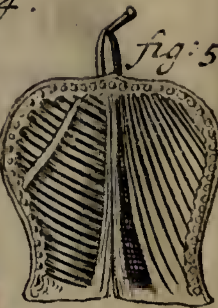

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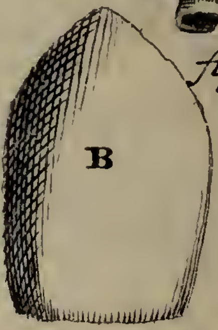

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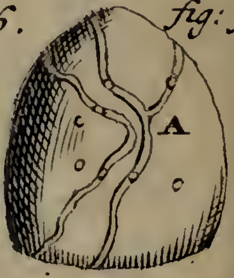

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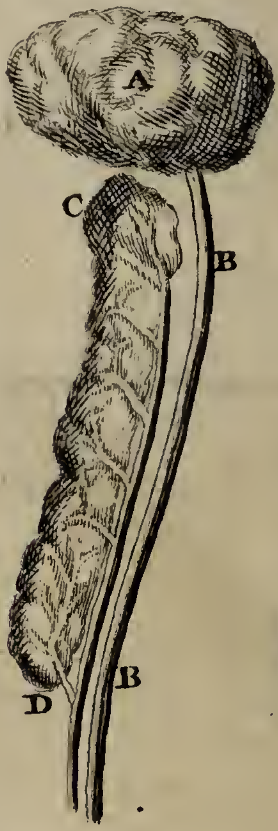

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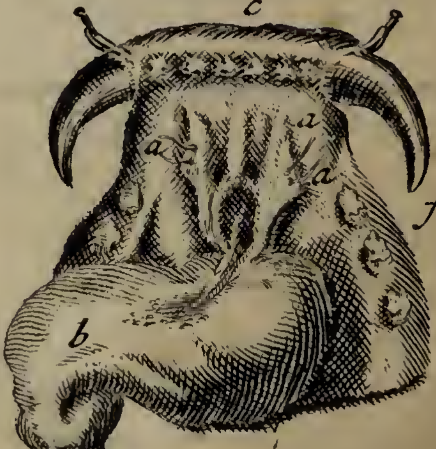

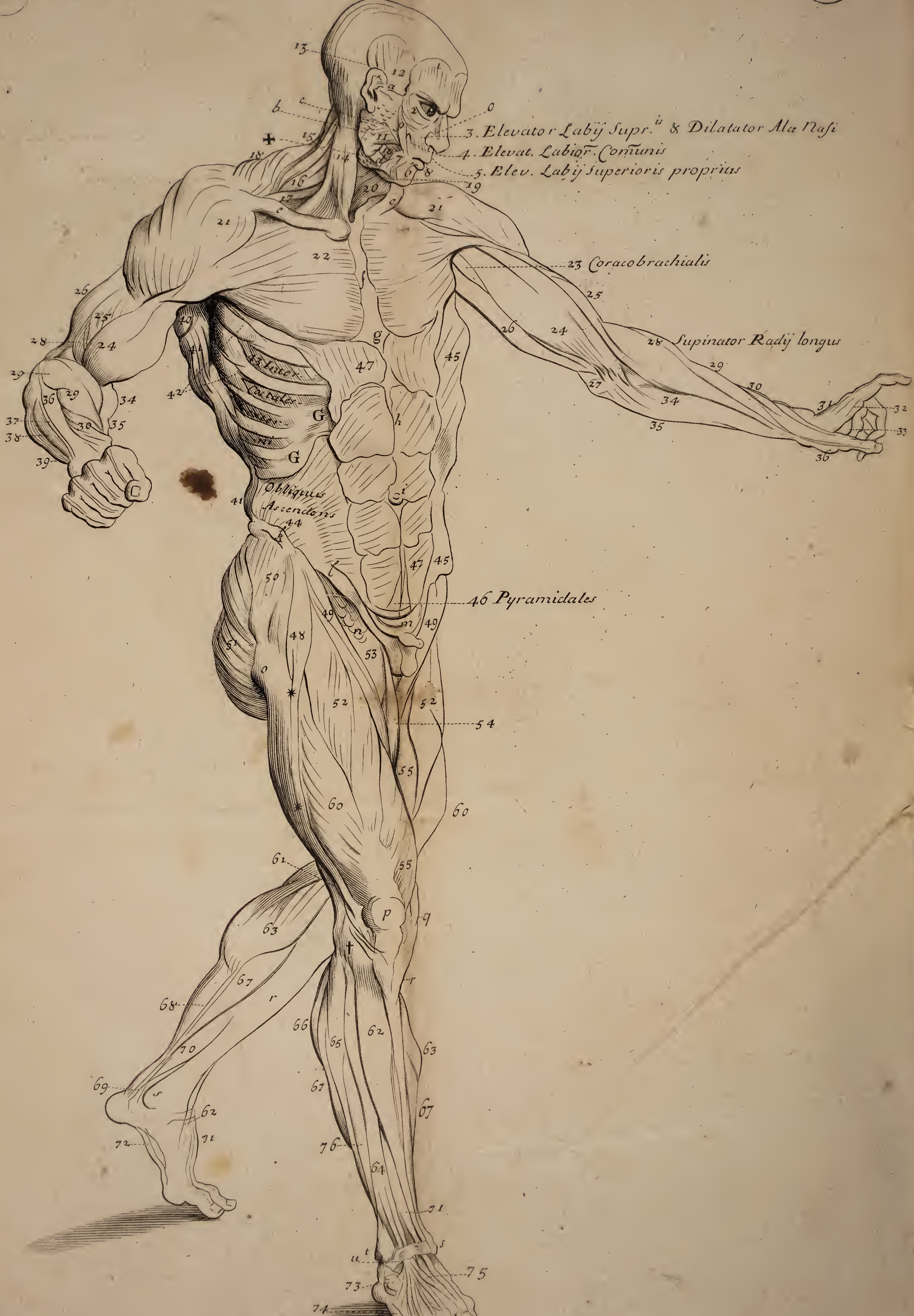
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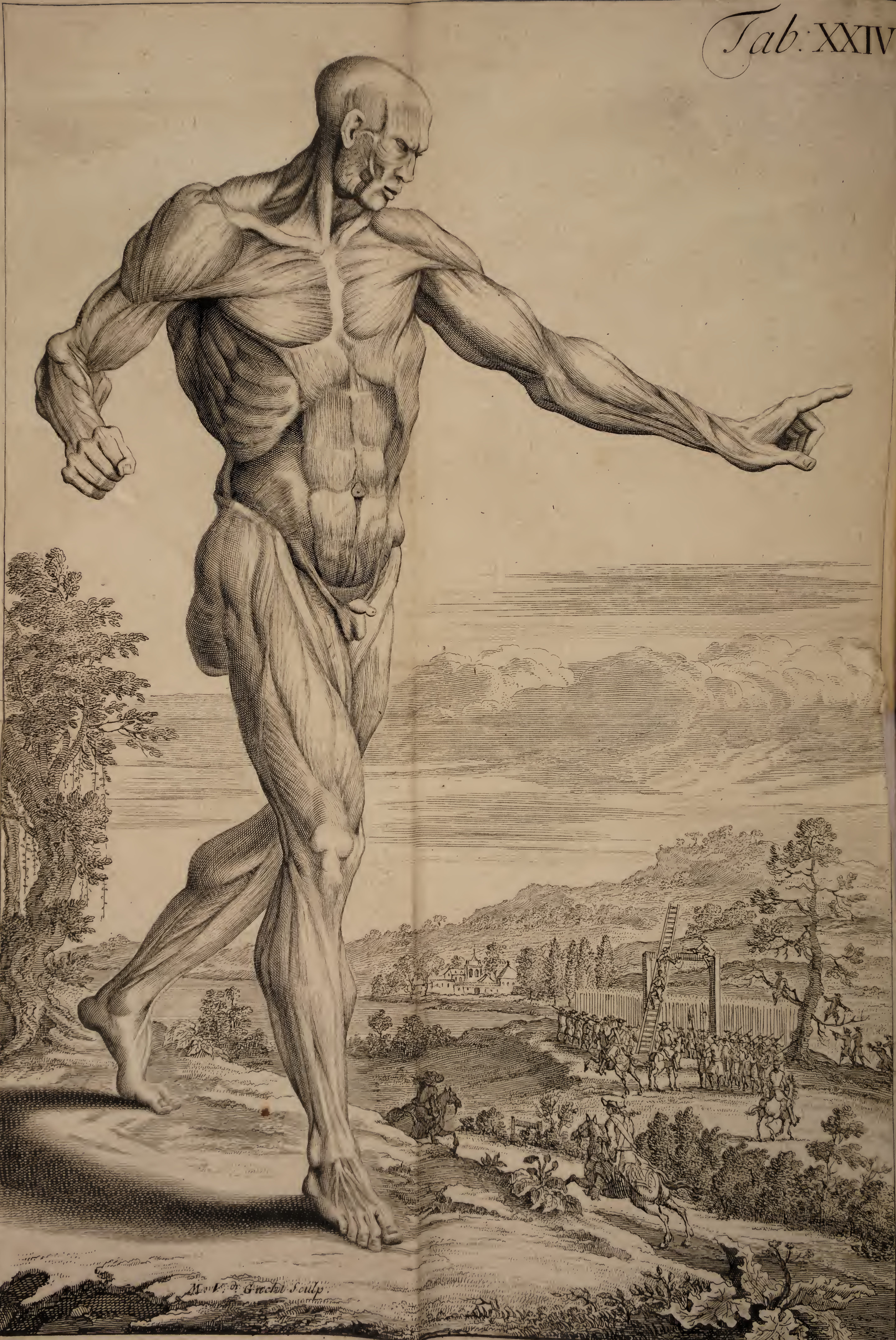

CHAP. XXIV.

Of the Catamenia, *or* Menſes.

THE *Periodical Purgations* of Women not with Child, or giving Suck, is a *Phænomenon* that has exercis'd the greateſt Wits of the *Faculty*, who after many learned Arguments, and many ingenious *Hypotheſes*, have not been able to come to any Agreement among themſelves.

Great Differences among Authors.

All Authors agree, that the neceſſity that Women have for ſome extraordinary Supply to recompence the Expence, and to ſupport them under it during the time of *Geſtation* was the final Reaſon, why this Redundance at other times was given to them.

Final Cauſe.

But this is the only Point, wherein they are generally agreed. Some not content with that occaſion alone, will have the Menſtruous Blood to offend in *Quality*, more than *Quantity*, which they argue from the Pain it gives many Women in the Evacuation. They ſay likewiſe, that the Malignity of them is ſo great, that they Excoriate the Parts of Men by the meer Contact; that the Breath of a Menſtruous Woman will give a permanent Stain to Ivory, or a Looking-glaſs; that a little of this Blood drop'd upon a Vine, or

Fabulous Qualities

or Corn, or any other Vegetable, they become Steril or Blaſted; that if a Woman with Child, be defil'd with the *Menſes* of another Woman, ſhe Miſcarries; that if a Dog taſts them, he runs Mad; if a Man, he becomes Epileptick; which, with abundance of other ſuch Fables, tho' recounted by many Grave, and ſome great Authors, I reject, as needing no Refutation, and have only recited them, to ſhew what things have been ſuperſtitiouſly taken up upon Credit, without ſufficient Examination by Men of great Authority, who have been prevail'd upon to believe, what the Women at all times would laugh at. Another thing likewiſe, which we ſhall not beſtow much time upon, is, the ſuppos'd Dominion of the Moon over the Bodies of Women in this caſe, a Fancy which anciently was the Univerſal Opinion, tho' common Experience, with a very little Reflection, might have ſhewn the Weakneſs of it. For if this Purgation had been caus'd by any Influence of the Moon, then all Women of the ſame Age and Temperament ſhould be purg'd according to the ſame *Periods* and *Revolutions* of the *Moon* at the ſame time, which daily Experience ſhews to be falſe.

Domini-on *of the* Moon.

There are two Opinions however, that are argued with a great deal of Strength and Reaſon, both which allow the Quality of the Blood to be Innocent, but they differ about the reaſon of its Iſſue. Dr. *Bohn*, and of late Mr. *Friend*, a learned ingenious Gentleman of *Oxford*, maintain that this *Flux* is the Reſult of a meer *Plethora*, and to be evacuated only for Relief againſt the Quantity.

Hypotheſes *from a* Plethora.

Others are of Opinion, that this Evacuation is owing to a *Fermentation* rais'd at that time, and that the Eruption of the Blood in thoſe Parts is the Effect of an Efferveſcence or Ebullition of the Blood. This Opinion has been maintain'd by many, but its chief Supporters are, the Learned Dr. *Charleton* here, the Ingenious Dr. *Bayle Profeſſor* of *Phyſick* at *Tholouſe*, and Dr. *De Graaf*, whom we have had ſo frequent occaſion to mention.

Fermentation.

The two firſt of theſe ſuppoſe a *Ferment* peculiar to the Women, which produces this *Flux*, and affects that part only, or at leaſt principally. *De Graaf*, leſs particular in his Notion, only ſuppoſes an Efferveſcence of the Blood rais'd by ſome Ferment without aſſigning how it acts, or what it is.

Mr. *Friend* (who has ſuſtain'd the Cauſe of a *Plethora* with the greateſt Clearneſs and Strength) ſuppoſes that this *Plethora* ariſes from a *Coacervation* in the Blood-Veſſels of a *Superfluity* of Aliment, which he thinks to remain over and above what

Mr. Friend's *Hypotheſis.*

is excreted by the ordinary ways, and that Women have this *Plethora*, and not Men, becauſe their Bodies are more humid, and their Veſſels, eſpecially the Extremities of them more ſlender, and their manner of Living generally more unactive than a Man's, and that theſe things concurring, are the occaſion that Women do not perſpire ſufficiently to carry off the Superfluous Alimentary Parts, and that therefore this Overplus muſt be retain'd in the Veſſels, till it be accumulated in ſuch Quantity, as to diſtend the Veſſels, and force its way through the *Capillary Arteries* of the *Uterus*. And he thinks this Diſcharge to happen in that Part, rather than in any other, becauſe it is more favour'd by the Structure of the Veſſels, the Arteries being very numerous, and the Veins very ſinuous and winding, and therefore more apt to retard the *Impetus* of the Blood, and conſequently in a *Plethorick* caſe, to occaſion a Rupture of the Extremities of the Veſſels, which may laſt, till by a ſufficient Diſcharge, the Veſſels are eas'd of their Overload.

This I take to be the Subſtance of that *learned*, *ingenious Gentleman's Hypotheſis*, from whence he very *Mechanically*, and very *Philoſophically*, deduces a *Rationale* of the *Symptoms*.

Plethora *not the cauſe of* Menſtruation.

To this *Hypotheſis* I could ſubſcribe, did not many Obſervations convince me, that there is no ſuch *Plethora*, or at leaſt, that it is not neceſſary to *Menſtruation*: For if the *Menſes* were owing to a *Plethora* ſo accumulated, the Symptoms would ariſe gradually, and the Heavineſs, Stiffneſs and Inactivity (neceſſary *Symptoms* of a *Plethora*) would be felt long before the *Abſolution* of the *Period*, and Women would begin to be heavy and indiſpos'd ſoon after their Evacuation, and the *Symptoms* would encreaſe day by day. But this is contrary to all Experience, and many Women, who have *them* regularly and eaſily, have no warning, nor other Rule to prevent an indecent Surprize, than the Meaſure of the Time; in which ſome that have ſlipt, tho' otherwiſe modeſt and careful Women, have been put to ſuch Confuſions and Shifts, as would not conſiſt with the Notice that a *Plethoric* Body would give.

No gradual Accumulation *of* Matter.

But even in thoſe who are difficultly this way purg'd, the *Symptoms*, tho' very vexatious and tedious, do not make ſuch regular Approaches, as a gradual Accumulation neceſſarily requires: If we conſider what violent Symptoms will come on in a Day, or an Hour, we ſhall be extremely puzzl'd to find out the mighty Acceſſion of Matter, that ſhould in an Hour or Days time make ſuch great Alterations. According to this

Hypotheſis, the *laſt* day contributes no more than the *firſt*, and conſequently the Alteration ſhould be no more ſenſible, excepting the bare *Eruption*: But it is neither my Buſineſs nor Intention to combat any Man's Opinion. The Learned Dr. *Bohn* has ſaid a great deal; and Mr. *Friend* has rendred this *Opinion* ſo plauſible, that I wiſh it were true; and muſt do him this Juſtice, that his is the firſt Account of the *Periodical* Revolution of the *Menſes* that I have met with, *Philoſophically* contriv'd, and like an underſtanding *Inquirer*. Moſt others have either given trifling or precarious Solutions, or paſt it over as a Difficulty beyond Humane Underſtanding.

Mr. Friend's Hypotheſis *plauſible.*

The *other Hypotheſis* of a Fermentation or Effervefcence of the Blood has had much worſe Luck: For either it has been ſlubber'd over as a thing whereof the *Fact* was certain, but the Reaſon inſcrutable, as *De Graaf* has left it; or eſtabliſh'd upon an *imaginary Ferment*, which never was prov'd to exiſt, and perhaps never will be.

Fermentation *not prov'd.*

The ſudden *Turgeſcence* of the Blood gave them reaſon to think, that it aroſe from ſomething till then *extraneous* to the Blood: But where to find that they did not know; and therefore had recourſe to the Parts ſuppos'd to be principally affected, and feign'd an imaginary Ferment, which no Anatomical Inquiry could ever ſhew, or affirm

No Receptacle *for* Fermentation *aſſigned.*

any reaſonable Receptacle for, nor no Reaſoning neceſſarily infer: But on the contrary, both *Autopſy*, and Reaſonings from it conclude againſt it; ſince neither the Fermenting Matter it ſelf, the Organs by which it ſhould be ſecreted, nor the Place where it ſhould be repoſited are to be found.

However the *Heat*, which accompanies the *Turgeſcence* of the Blood, ſhews, that it is not meerly *Plethorical*, but that there is an extraordinary Inteſtine Motion at that time: Which is likewiſe confirm'd by the Operation of moſt Medicines conducing to that end, which are moſt of them ſuch as will give a *Fermentative* Motion to the Blood; or ſuch as will ſtop an extraordinary Flux of Humors another way, which is one of the ordinary Cauſes of a defect of the *Menſes*. For this Reaſon *Vitriolick*, and other *Reſtringent Medicines*, which are ſometimes given with Succeſs in Obſtructions, as they are call'd, are not ſtrictly to be reckon'd among the *Provocants*, but to the number of thoſe that by rectifying the Tone of the Stomach and Inteſtines, ſtop extraordinary Fluxes that way, and by degrees mend and invigorate the Blood, which by ſuch Diſcharges is impoveriſh'd.

Operation of Emmenagoges.

The neceſſity of a Receptacle *prov'd from the ſuddenneſs of its* Symptoms.

The ſuddenneſs and violence of the Efferveſcence, which is ſuch as to break out at the *Noſe*, *Hæmorrhoids*, *Lungs*, *Stomach*, *Eyes*, and indeed almoſt any part of the Body.

dy, ſhews, that whatever is the Cauſe, it is ſomething very active, and that may be introduc'd in quantity in a ſhort time into the Blood; and conſequently, that it muſt be ready gather'd in ſome Receptacle, where, while it was contain'd, its Action was prohibited. For, if it had been ſcatter'd in the Blood it ſelf, it muſt either have acted conſtantly and regularly, and then no ſuch *Critical* Evacuation could happen; or it muſt exert its Power gradually according to its increaſe in the Blood, and ſo the Symptoms muſt have approach'd in the ſame manner as we have argu'd againſt a *Plethora*

Gall-Bladder *the* Receptacle, *and* Bile *the* Ferment.

The only Humour which I can find in the Body, ſo circumſtantiated as this *Phænomenon* ſeems to require, is the *Bile* contain'd in the *Gall-Bladder*. This is a *Liquor* that probably may have divers Uſes, and produce many Effects in an Animal Body which are yet unobſerv'd: But univerſal Experience agrees that it is capable of raiſing Diſorders, or *Fermentations extraordinary*, whenever it inſinuates it ſelf in quantity into the Blood. And as it is contain'd in a peculiar Receptacle, which ſeems not to admit of a conſtant Iſſue, it may be there reſerv'd, till in a certain Period of time the *Bladder* becoming turgent and full, thro' the Compreſſion of the incumbent *Viſcera*, it emits the *Gall*, which, by the way of the *Lacteals* inſinuating it ſelf into the Blood, may raiſe that *Effervescence*, which occaſions the *Aperture* of the *Uterine Arteries*.

Farther prov'd by Obſervations on Bilious Conſtitutions.

All Obſervations agree, that Perſons of a *Bilious* Conſtitution are either more plentifully, or more frequently purg'd this way; and I my ſelf have obſerv'd divers *Bilious* Perſons, who tho' obnoxious to a *Fluxus alvi*, which kept them far from a *Plethorick* Condition, were however vex'd with a *Menſtruous Hypercatharſis*: And it is obſervable, that Men of *Bilious* Conſtitutions are more frequently troubled with the *Piles*, than others; and that Diſtempers manifeſtly *Bilious*, are attended with Symptoms reſembling thoſe of Women, who labour under difficult *Menſtruation*: Their *Pulſe* increaſes, their *Heads* ake, they *Vomit*, they have *Cholical Pains*, and feel a general *Fulneſs* and *Stiffneſs*, and are reliev'd in great meaſure by Bleeding from moſt of theſe *Symptoms*, which a Critical Diſcharge carries off.

Women abound with Humours *of all ſorts more than Men.*

It may be objected, That Men abound with *Bile* as well as Women: But to that Objection I take the liberty to anſwer, that they do not, nor with any other Humour that is permanent in the Body, *Semine excepto*. For as in Men the *Pores* of the Body are more open, and carry off more of the *Serous* part of the Blood, which is the Vehicle of all the other Humours; ſo conſequently, a greater part of each of them is

Why not theſe Diſcharges *in Men ?*

is diſcharg'd thro' them, than in Women; in whom the Superfluity muſt continue to circulate with the Blood, or be gather'd into proper Receptacles, which is the Caſe of the Bile.

Why not in Brutes ?

The ſame Argument which holds, Why *Menſtruation* ſhould not belong to Men? will hold likewiſe in Brutes; whoſe Pores are manifeſtly more open than thoſe of Women, as appears by the Crop of Hair which they bear; for the Vegetation of which, a larger Cavity, and a wider Aperture of the Glands is neceſſary, than where no ſuch thing is to be produc'd. Yet there is a difference in this Point between the *Males* and *Females*, even in them: Theſe latter have their *Terms*, tho' not ſo often as Women, nor in the ſame Form or Quantity, though Blood ſometimes be the reſult of them.

No ſatiſfactory Reaſon yet given, why a more acrimonious ſort of Bile *ſhoud be ſeparated in a* Receptacle.

No Anatomiſt, that I know of, has yet offer'd a ſatisfactory Reaſon, Why a ſort of *Bile*, more thin and acrimonious, ſhould be ſeparated into a Receptacle by it ſelf, and not conſtantly diſcharg'd, as that of the *Porus bilarius* is. They have generally referred it for the uſe of Chylification; but beſides that it appears to be no proper Ingredient of ſo ſweet a Juice as Chyle is, they have but precariouſly affirm'd it only, and have not given us any neceſſary, nor to me convincing Arguments, of its *Inſtrumentality* in that Caſe; nor indeed can I help ſaying, that they have brought it without neceſſity into an Operation which might be compleat without it.

Not neceſſary to apply it to the Phœnomena.

I think it unneceſſary to apply this *Hypotheſis* to the ſeveral *Phænomena* of the *Menſes*, whether in a natural, regular, or a diſeaſed Caſe. The Solution of particular *Problems*, relating to this part of the Animal Hiſtory, flows very readily and naturally from it; and whatever may be urg'd for the *Power* of a *Plethora*, or of any *particular Ferment*, may be apply'd without any ſtraining to this. The only difficulty is, Whether the *Bile* be a ſufficient Inſtrument to produce theſe Effects: And if it be, whether it does get into the Blood, as I conceive, I ſhall not ſwell this Work with Arguments to prove theſe two Points. For one I think is on all Hands confeſs'd, and the other I think reaſonable to be believ'd. What I deliver, I lay down *Problematically*, with free Liberty to all Mankind to examin it impartially, and ſhall be as ready to receive the Truth, however contrary to my preſent Sentiments, as I am now to impart my own Opinion.

CHAP. XXV.

Of Generation.

The Cauſe of Generation *not ſufficiently accounted for.*

THE *Organs* of *Generation* have been already deſcrib'd: But there remain ſome Doubts about the efficient Cauſes of it, which are not ſufficiently adjuſted. It is agreed on all Hands, that there are in the *Ovaries* of *Women* little *Eggs*.

Theſe *Eggs*, moſt *Modern Anatomiſts*, and the moſt Able till very lately, have maintain'd to be the *material* and *formal* Rudiments of the Body of the *future Man*, which the *Seed* of the *Male* did only impregnate and vivifie. But that the *Ovum* it ſelf did, before Impregnation, formally and materially contain the Body of the *Man*, tho' it could not germinate and increaſe, till rendred Prolific by the Seed of the Male.

Dr. Harvey's *Opinion concerning it.*

This Opinion was firſt broach'd, and laid down with Strength of Reaſon, by our great Countryman Dr. *Harvey*, in his Book *De Generatione Animalium*. It procur'd almoſt univerſal Aſſent from the Writings of that Author; and ſeem'd perfectly eſtabliſh'd by *De Graaf*, till the *Microſcopial* Obſervations of Mr. *Lewenhook* grafted ſomewhat upon it, and took ſomething from it.

Mr. Lewenhook's *Opinion.*

That ingenious Gentleman, to whoſe happy Curioſity we are oblig'd for abundance of uſeful Diſcoveries, pretends by his Microſcopes, to have diſcover'd in the Seed of the Male, as well *Human*, as of divers ſorts of *Animals*, innumerable extremely minute *Animalcles*, moving with great Vigor and Celerity in the Fluid; which he maintains to be Animals of the *Species* of that Creature whoſe the Seed is.

Animalcula in Semine.

The Communication of his Obſervation, has mov'd the Curioſity of abundance of other Learned Men to make the ſame Inquiry, with ſuch Glaſſes as he has deſcrib'd; and by their own Acknowledgments, they appear to have done it with the ſame Succeſs. I have had the ſame Curioſity; and muſt confeſs, that the Appearance anſwered beyond my Expectation, and came up to all the Repreſentations that had been given of it.

Farther confirm'd by Obſervation.

The *Animalcles* (notwithſtanding the very ſmall compaſs the Eye can take in at once thro' ſuch a Glaſs) appear'd in prodigious numbers, moving with great Velocity, diverſly, and, as it ſeem'd, arbitrarily: Their Figure was exactly like that of *Tadpoles*, and they appear'd in the Liquor black like them, and about the ſize they are figur'd in the *Philoſophical Tranſactions*, Num. 284. where a Deſcription of them more at large may be found; what I have here ſaid being ſufficient for my purpoſe.

Their Appearance.

This

The Animalcle *the intire* Fœtus.

This *Diſcovery* has been the Foundation of a *new Theory* of *Generation:* In which this *Animalcle* is ſuppos'd to be the entire *Fœtus*, and the *Ovum* before-mentioned to be only a kind of *Matrix*, and to afford a *Pabulum* to the *Embryo*. For notwithſtanding this Diſcovery, the Exiſtence of true *Ova* in viviparous Females is not conteſted, nor is it indeed conteſtable.

Theſe Hypotheſes *under difficulties.*

I ſhould very readily go into this latter *Hypotheſis*, if I did not meet with ſome inſuperable Difficulties (to me at leaſt they appear ſuch) which equally preſs either *Hypotheſis.* The firſt ſuppoſes the Animal to be entirely included in the *Ovum*, before Impregnation; and that the Seed of the *Male* does only vivifie, or give Life and Power of Vegetation, as we ſaid before. The latter affirms the *Embryo* to be intire, perfect and alive in the Seed of the Male; and like the Seed of a Plant, to want only to be caſt into a *Soil* or *Matrix*, 'proper for its Increaſe or Vegetation, which they ſuppoſe the *Ovum* to be.

Mongrel Breeds *an Objection againſt it.*

But neither of theſe *Hypotheſes* accounts fairly and fully for *mix'd Generation:* For beſides the vaſt variety of *Mongrel Dogs*, begotten betwixt *Sires* of different *Species*, there have been abundance of Obſervations of Mixtures of Animals of more remote Kinds; ſuch as between a *Pheaſant-Cock* and a *Hen:* A *Bull* and a *Mare*; which has been often enough obſerv'd to procure a particular Name, and is call'd a *Gimar:* A *Cat* and a *Rat* (of which, however improbable it may ſeem, there is an Honourable Family that can produce abundance of Witneſſes); A *Buck-Rabbet* and a *Guinea-Sow*; of which lately I have had a very Credible Account. But the moſt common of all theſe

Animals of mix'd Breed (except the Dogs) is the *Mule*, begotten by an *Aſs* upon a *Mare.*

The Fœtus *not following the* Species *of the* Mother, *ſhows the* form'd Animal *not to be contain'd in the* Ovum.

If the *Ovum* contain'd the form'd Animal, then the *Fœtus* ought to follow the *Species* of the *Mother*, let the *Sire* be what it will: Becauſe he contributes nothing but means of Life and Vegetation, the Animal being determin'd before-hand: And the *Kind* ſhould be as certain as in *Plants*; where, let the Seed be thrown into what Soil ſoever, that does not alter the Species of the Plant, tho' it may the Growth and Vigor of it.

The ſame Objection to be urg'd againſt Animalcula in Semine.

The ſame Objection lies yet ſtronger againſt the *Animalcles.* For if that *Hypotheſis* be true, the *Sperm* of an Aſs is full of *little Aſſes*; and the being nurs'd by a *Mare* ſhould never make *Mules* of them, becauſe the *Species* is pre-determined, and the Creature not only form'd, but living. I might perhaps as reaſonably object, the Similitude that the Children of the ſame Parents bear to their Anceſtors; ſome to the Father's Line, and ſome to the Mother's: which plainly ſhews, that to the Determination of the Species, both Sexes concur; and that ſometimes one may prevail, and ſometimes the other; which could not be, if both theſe *Hypotheſes* were ſtrictly or abſolutely true. I know ſome endeavour to get over this Objection, by fancying that the different *Matrix* may have ſo much effect, as to alter the Figure of the Animal ſo far, as may account for theſe mixt Appearances. But this is ſo poor, ſo un-philoſophical a ſhift, that it is not worth an Anſwer; and they might with as good Authority perſuade me, that an Orange-tree tranſplanted from *Sevil* to *England* would bear Apples; and ſo *vice verſa.* It is a common Practice in Gardning, to graft one Fruit upon another Stock:

But the Fruit ſtill follows the Species of the Graft or Cyon, and bear like the Parent-Tree, not the Stock it grows upon.

A Plaſtick Power.

Theſe Difficulties render both theſe *Hypotheſes* unſatisfactory to me: and however old and exploded the Opinion of a *Plaſtick Power* on both ſides be, I muſt however embrace it, even tho' I know not exactly wherein it lies; at leaſt till I meet with ſomewhat more ſufficient to reſolve my Doubts than hitherto I have done.

A form'd Animal *in the* Ovum *not prov'd.*

It is however agreed, that tho' the *Ovum* of the Female does not formally contain the Animal, yet in Impregnation that it is a *Cauſa ſine qua non*, and that Generation cannot be without an Egg rightly diſpos'd: And upon that Conceſſion (which I think is at this time univerſal) I ſhall proceed to examin ſome of the principal *Phœnomena* of *Generation*, and the requiſite Condition of Fœcundity, without concerning my ſelf farther with the Animalcles of either ſide; except only to obſerve, that the Exiſtence of a form'd Animal in the *Ovum* has never been prov'd, but ſuppos'd only from the Analogy it is imagin'd to bear to the Seed of Plants, in ſome of which the Figure of the Plant has by the Microſcope been diſcover'd. The other *Hypotheſis* ſeems to ſtand upon the Foot of Autopſy, but Reaſon, as we have obſerv'd, ſeems to be againſt it: And it is not impoſſible, but that theſe ſeeming *Animals* may be nothing more than ſome larger Particles of a mixt Fluid, whoſe Motion and different Figure the Microſcope diſcovers to our Eye, while yet the minuter Parts will not diſcover themſelves, even that way. But we leave thſe things to the Arbitrement of the Learned.

The ſeeming Animals *may be only Particles of a mixt Fluid in motion.*

APPEN-

TAB. XXVIII.

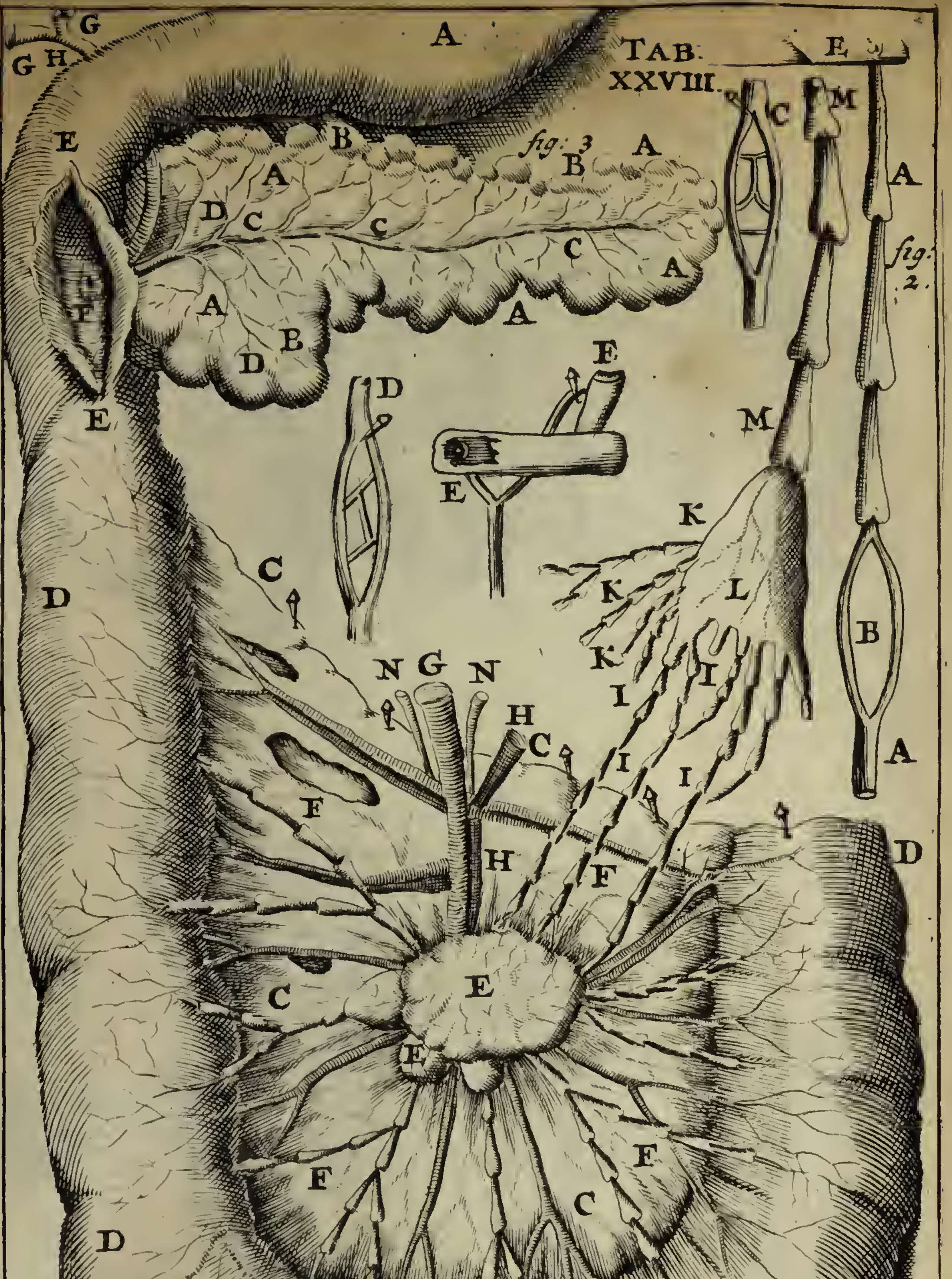
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fig: 2.
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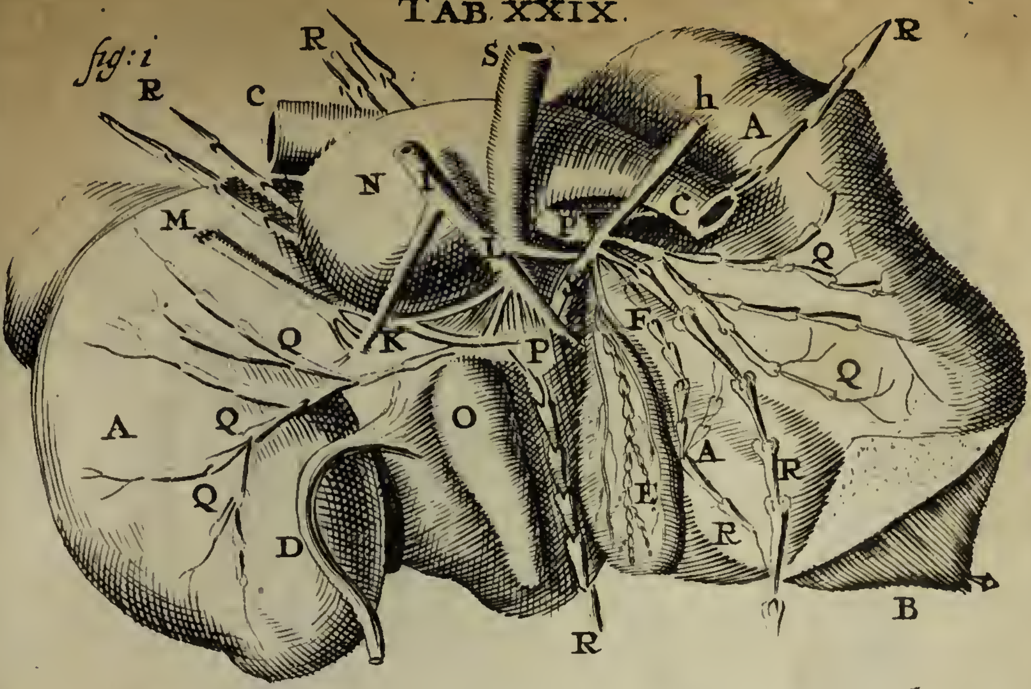
fig: 1

TAB. XXIX.

fig: 1



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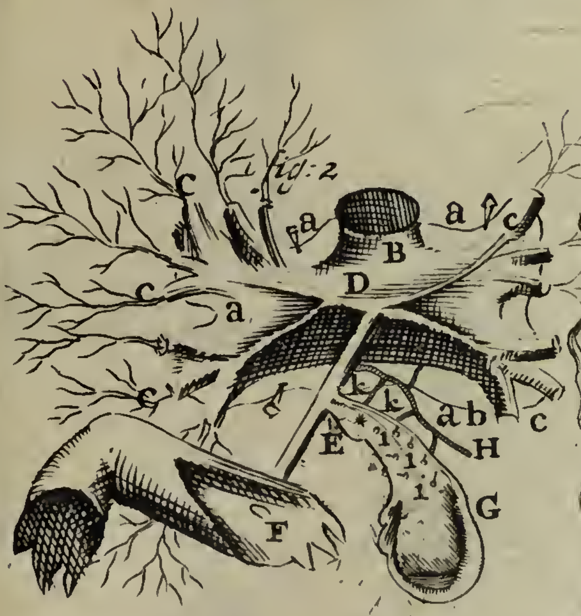
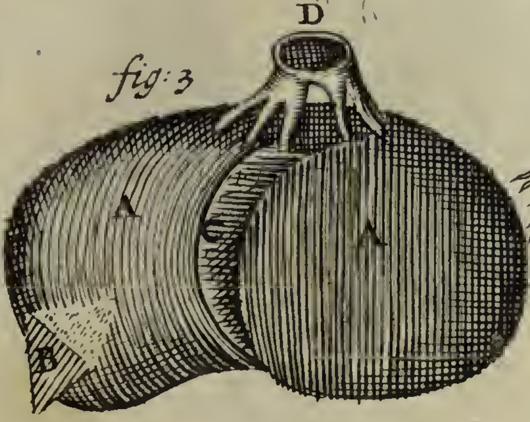


fig: 3



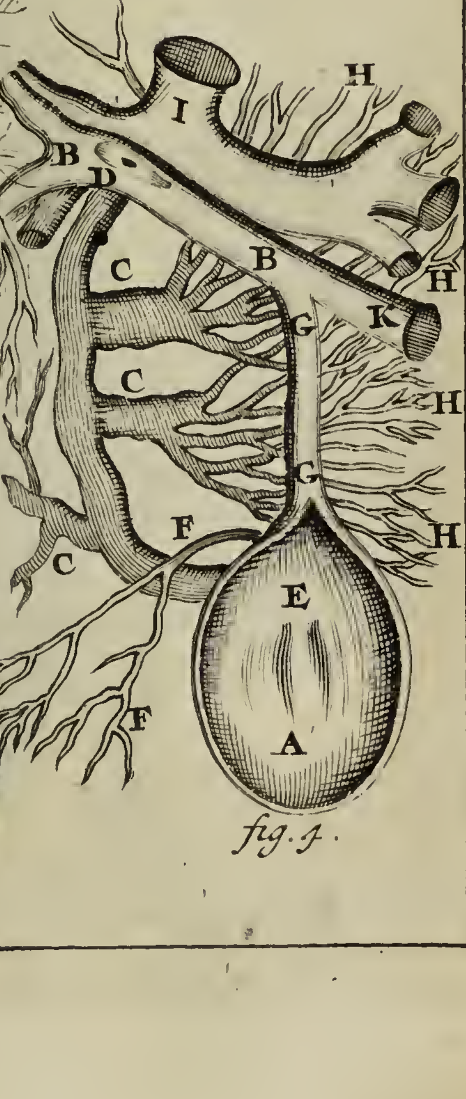


fig. 4.

TAB XXX.

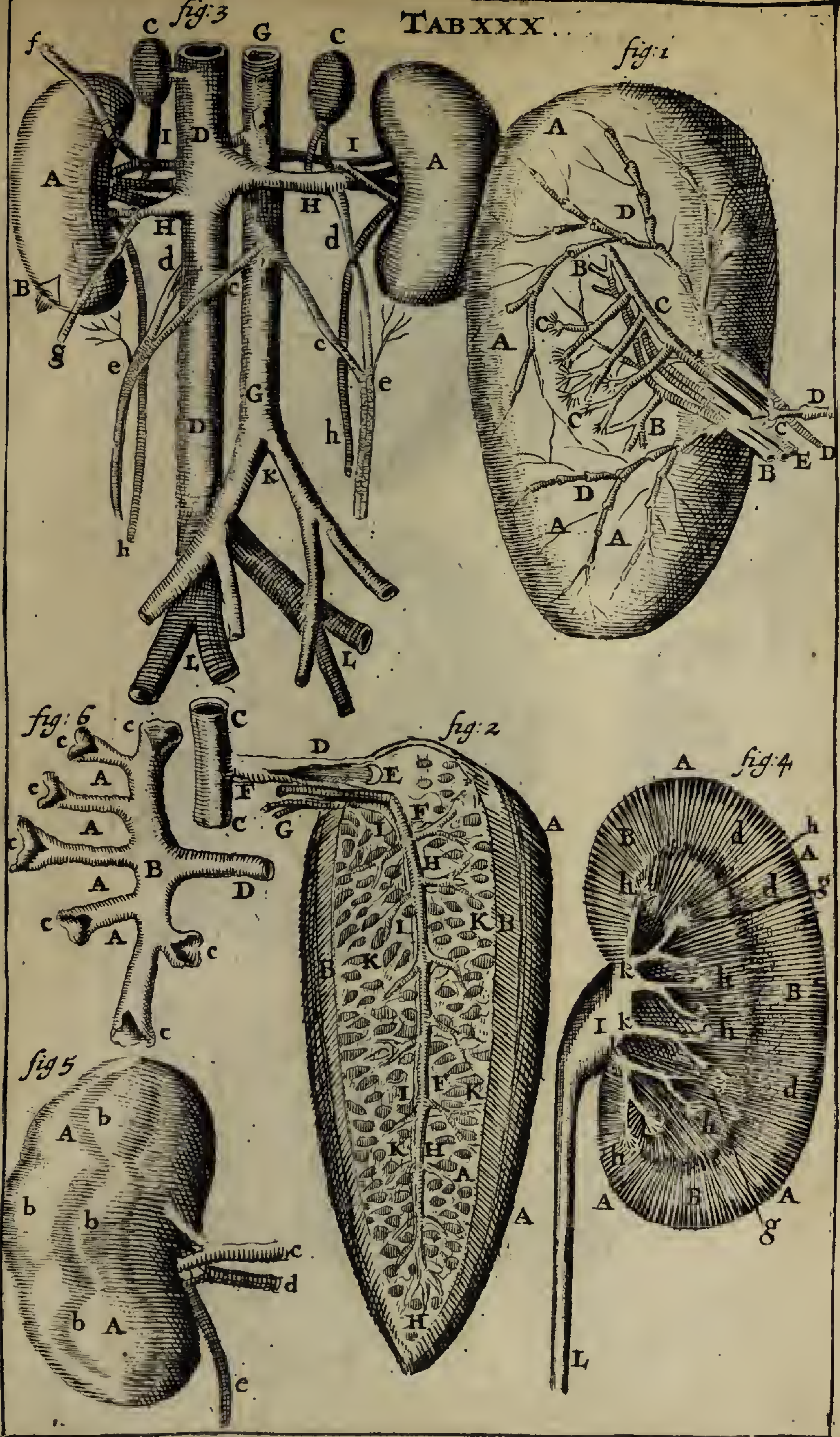

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fig:1
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fig:6
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fig:2
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fig:4
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TAB: XXXI.

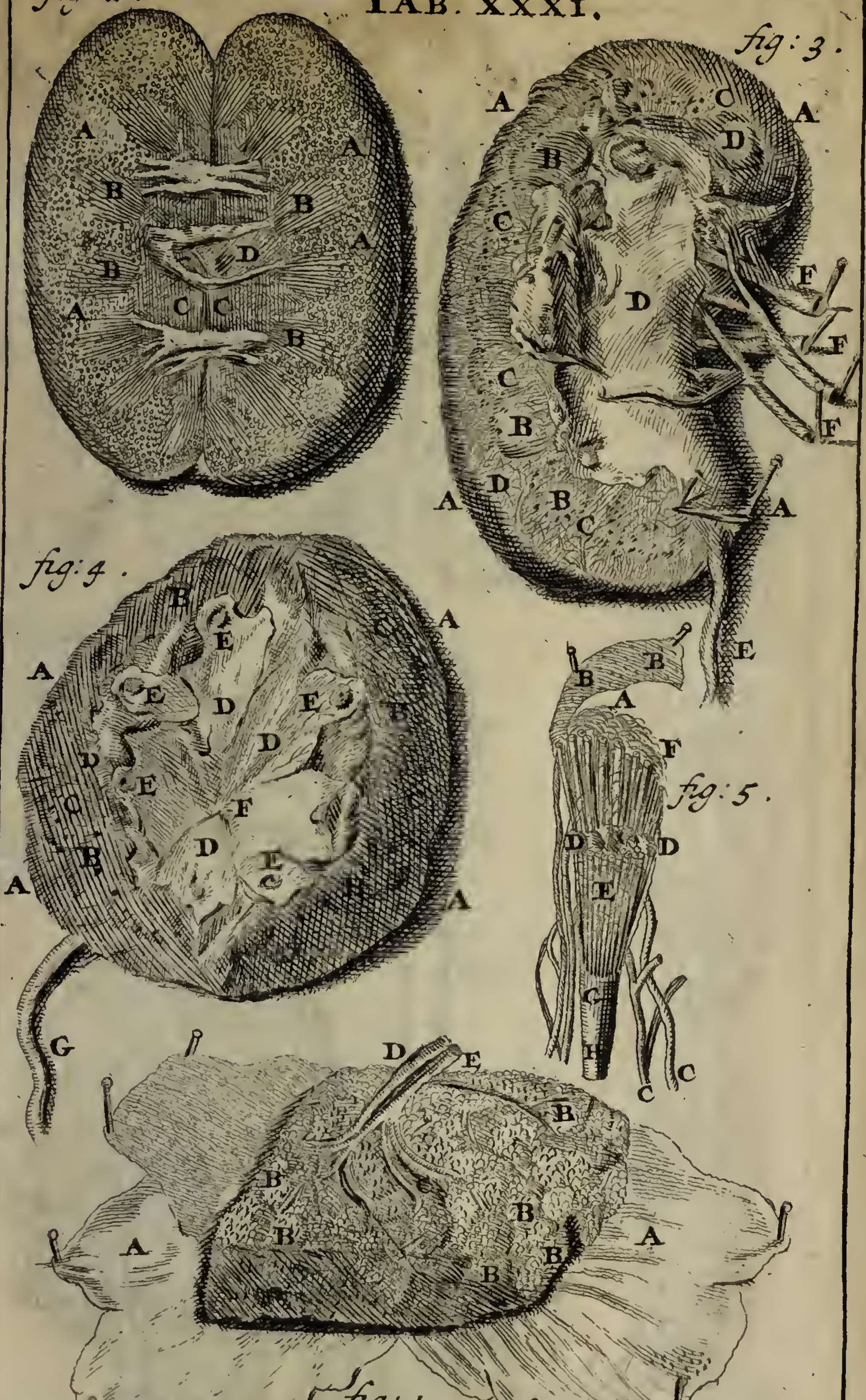
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fig: 4.
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F
fig: 5.
D
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fig: 1.

TAB XXXII

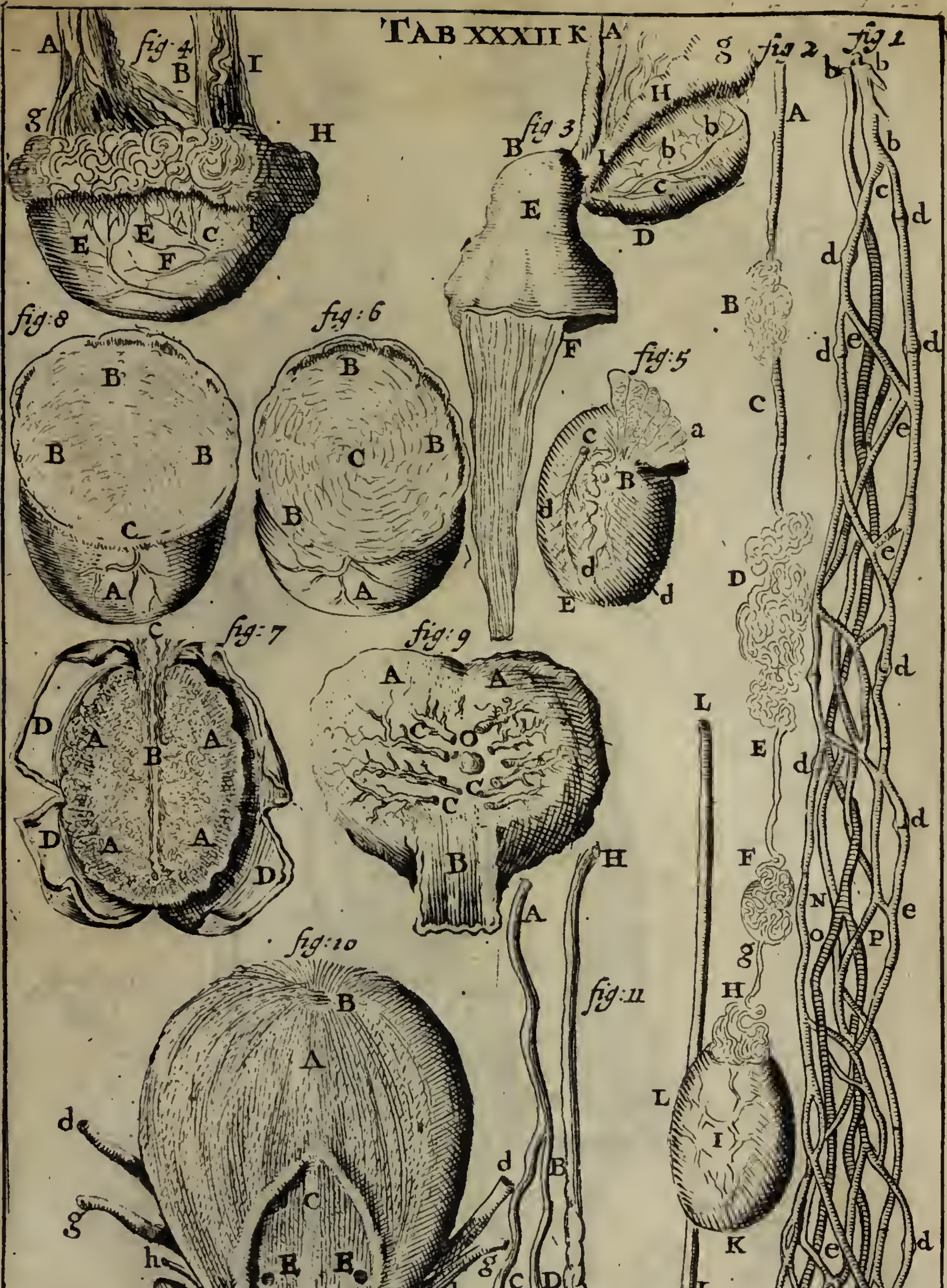
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fig: 8
fig: 9
fig: 10
fig: 11
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TAB XXXIII.

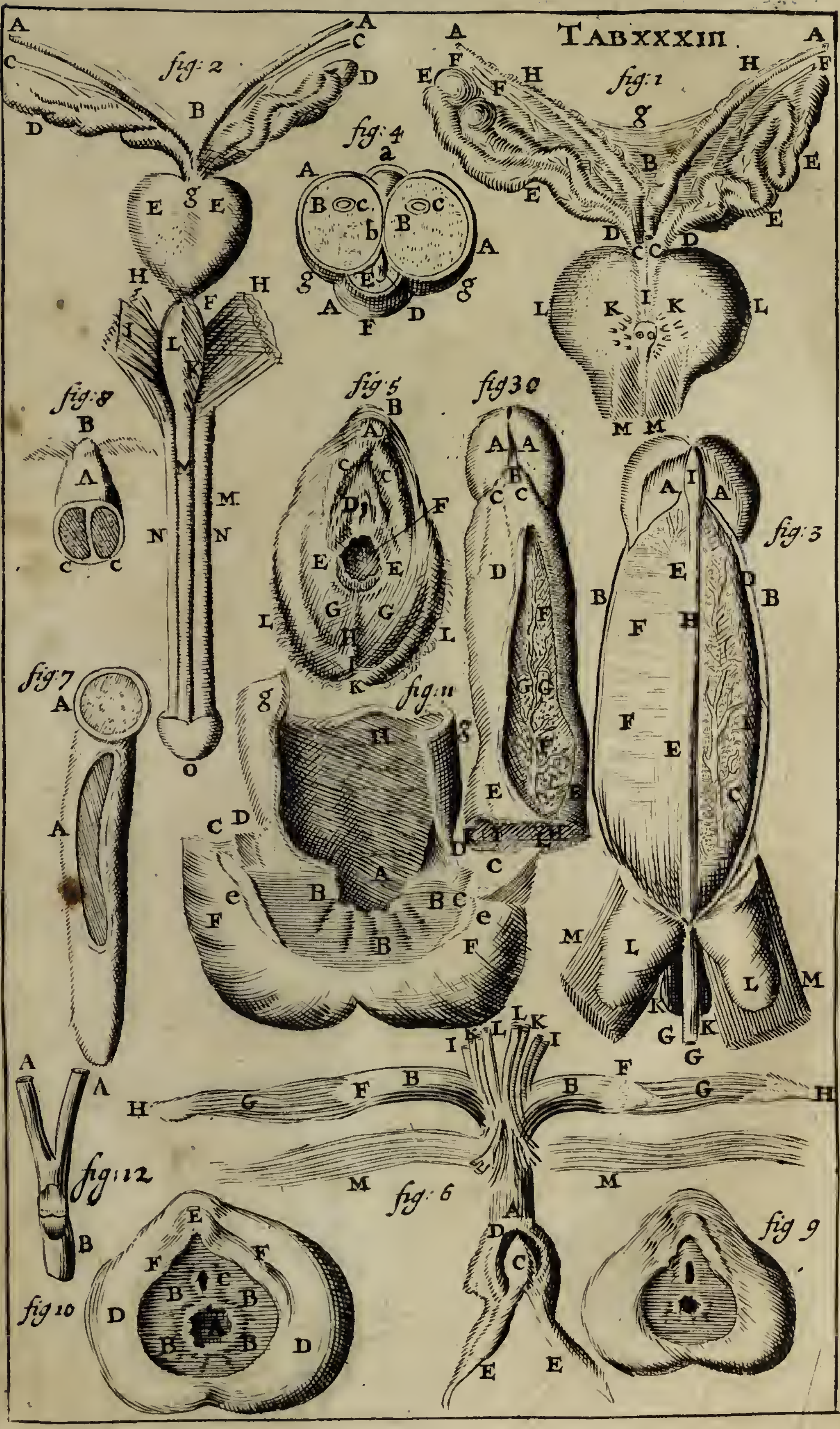
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fig: 2
fig: 3
fig: 4
fig: 5
fig: 6
fig: 7
fig: 8
fig 9
fig 10
fig: 11
fig: 12
fig 30
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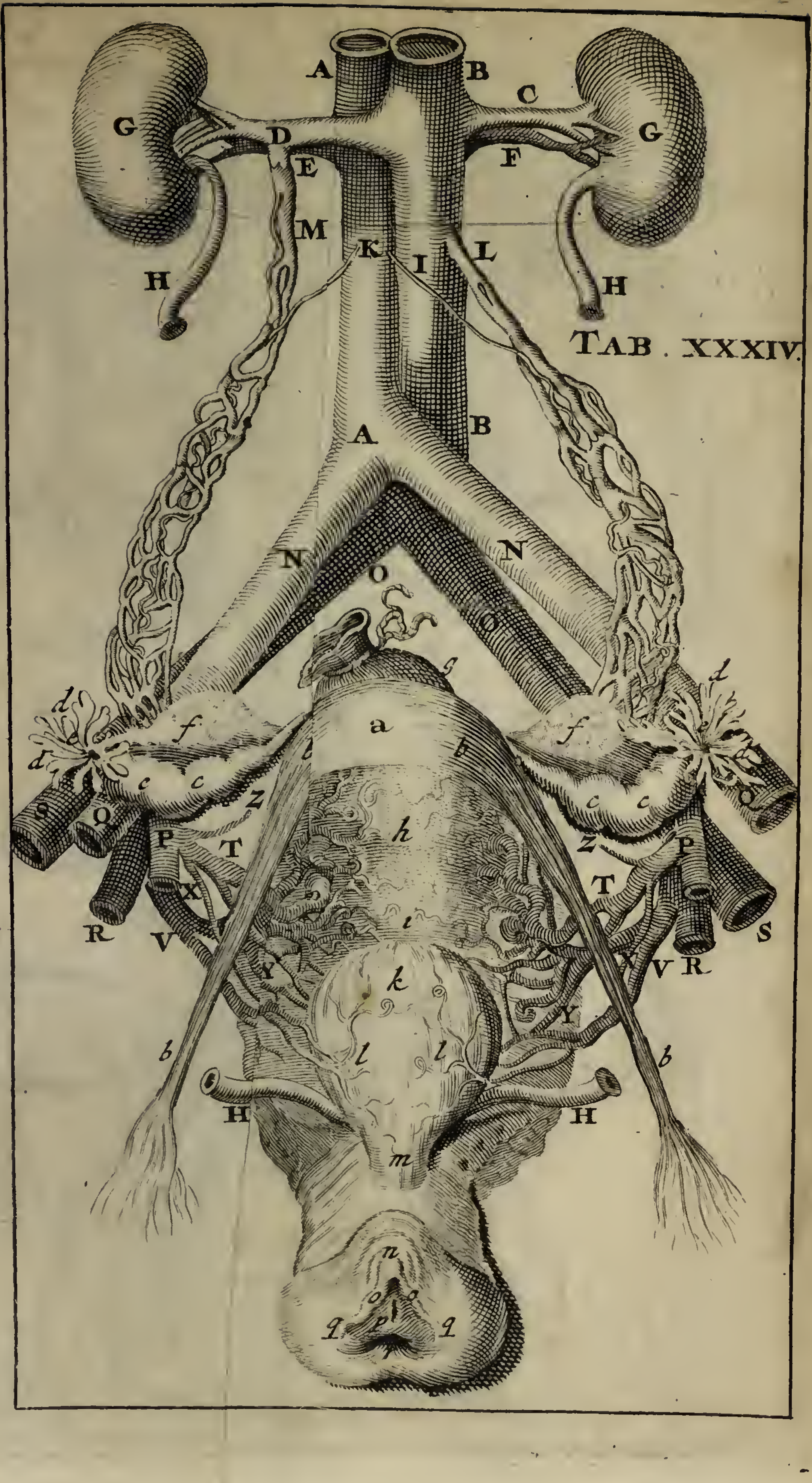
TAB. XXXIV.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TAB. XXXV.

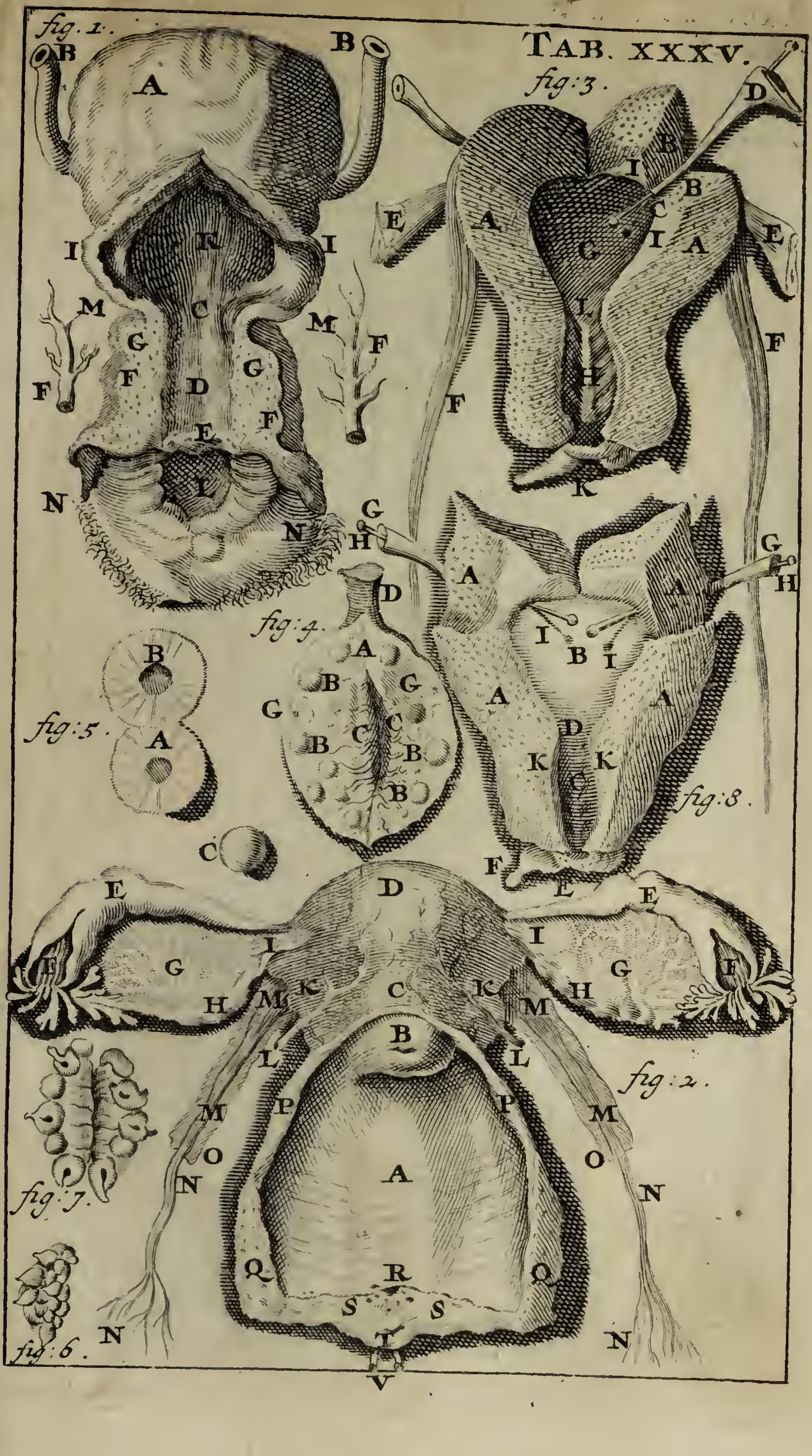
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fig: 3.
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K
fig: 8.
G
H
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G
A
H
I
B
I
A
A
D
K
K
O
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E
E
fig: 4.
D
A
B
G
G
C
C
B
C
B
B
fig: 5.
B
A
C
fig: 2.
D
E
E
I
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G
G
F
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M
K
C
K
M
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P
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fig: 7.
fig: 6.

TAB: XXXVI

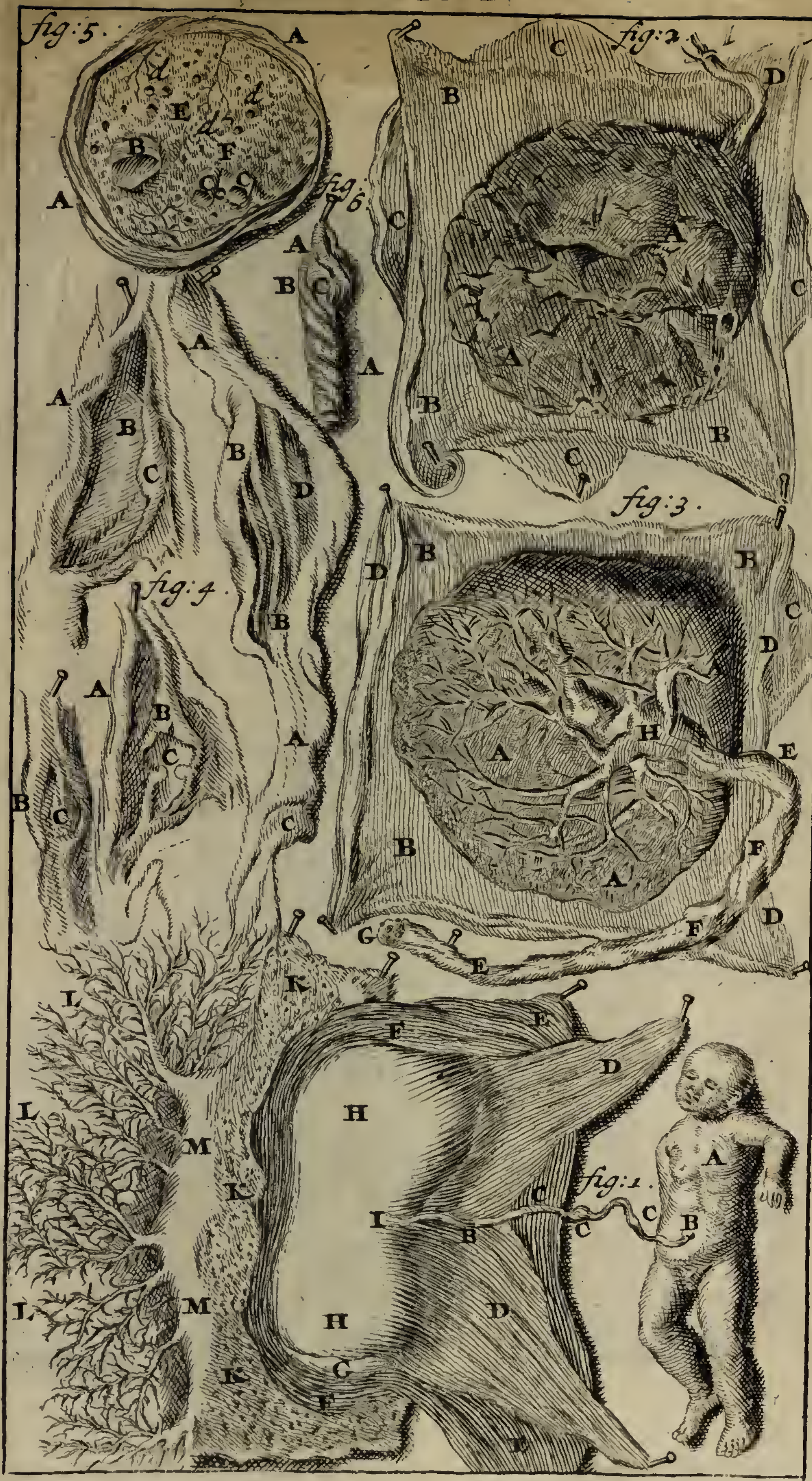
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fig:2
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B
fig:3.
B
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H
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G
F
E
fig:4
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D
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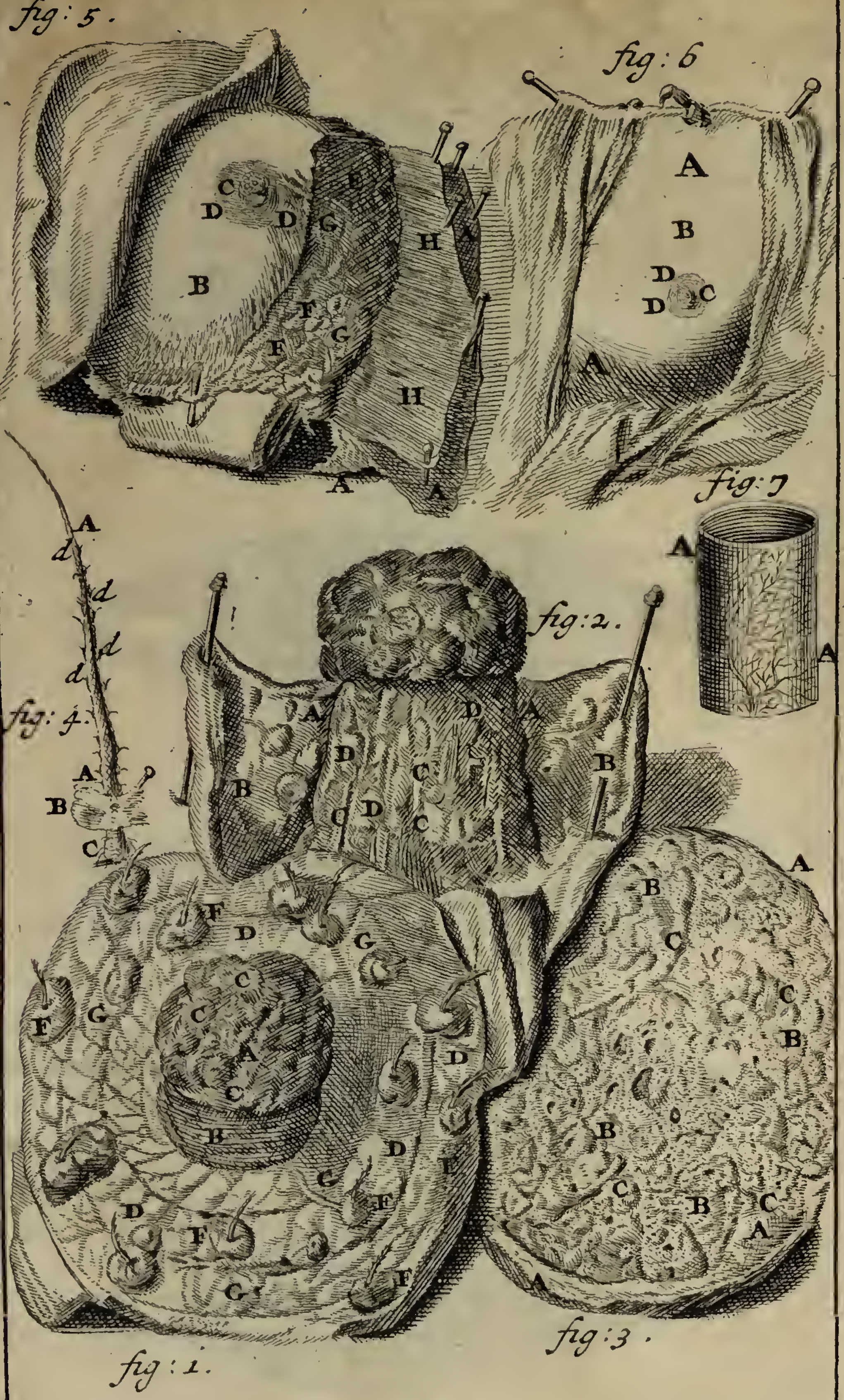
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fig: 6
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fig: 7
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fig: 4.
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C
fig: 2.
A
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C
fig: 1.
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TAB.XXXVIII.

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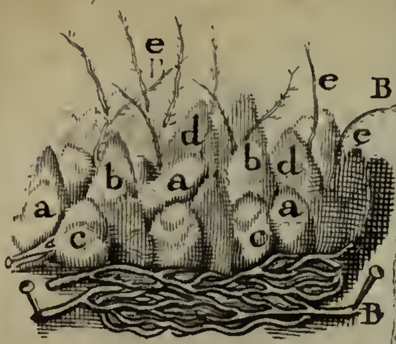

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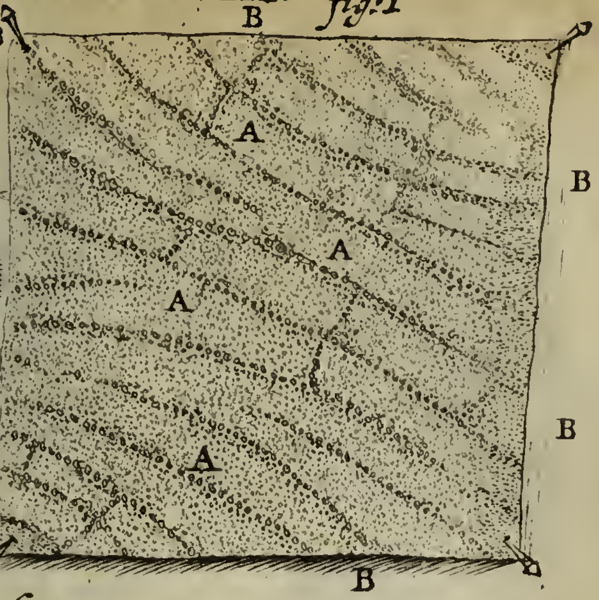

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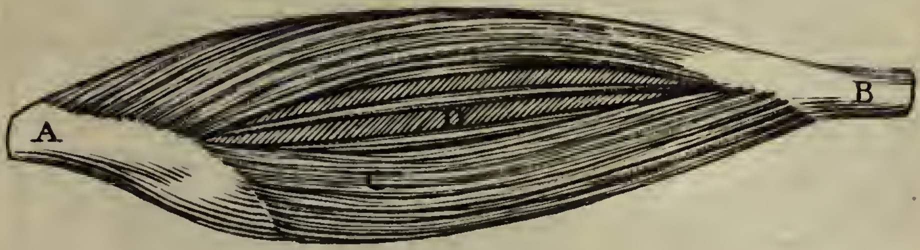

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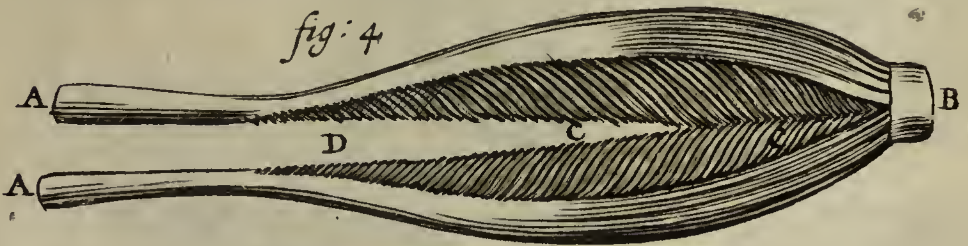

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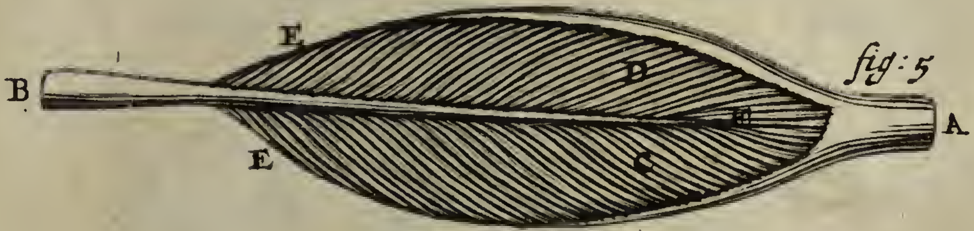

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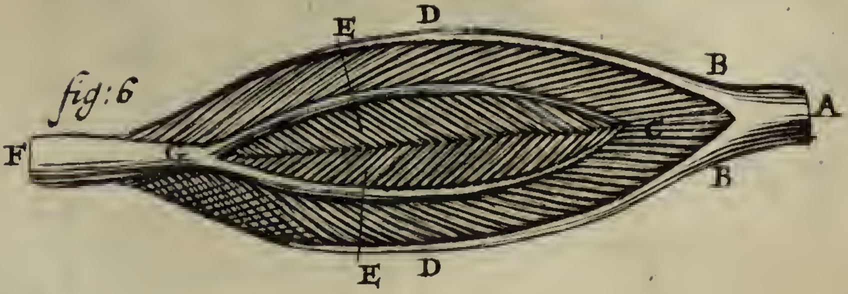

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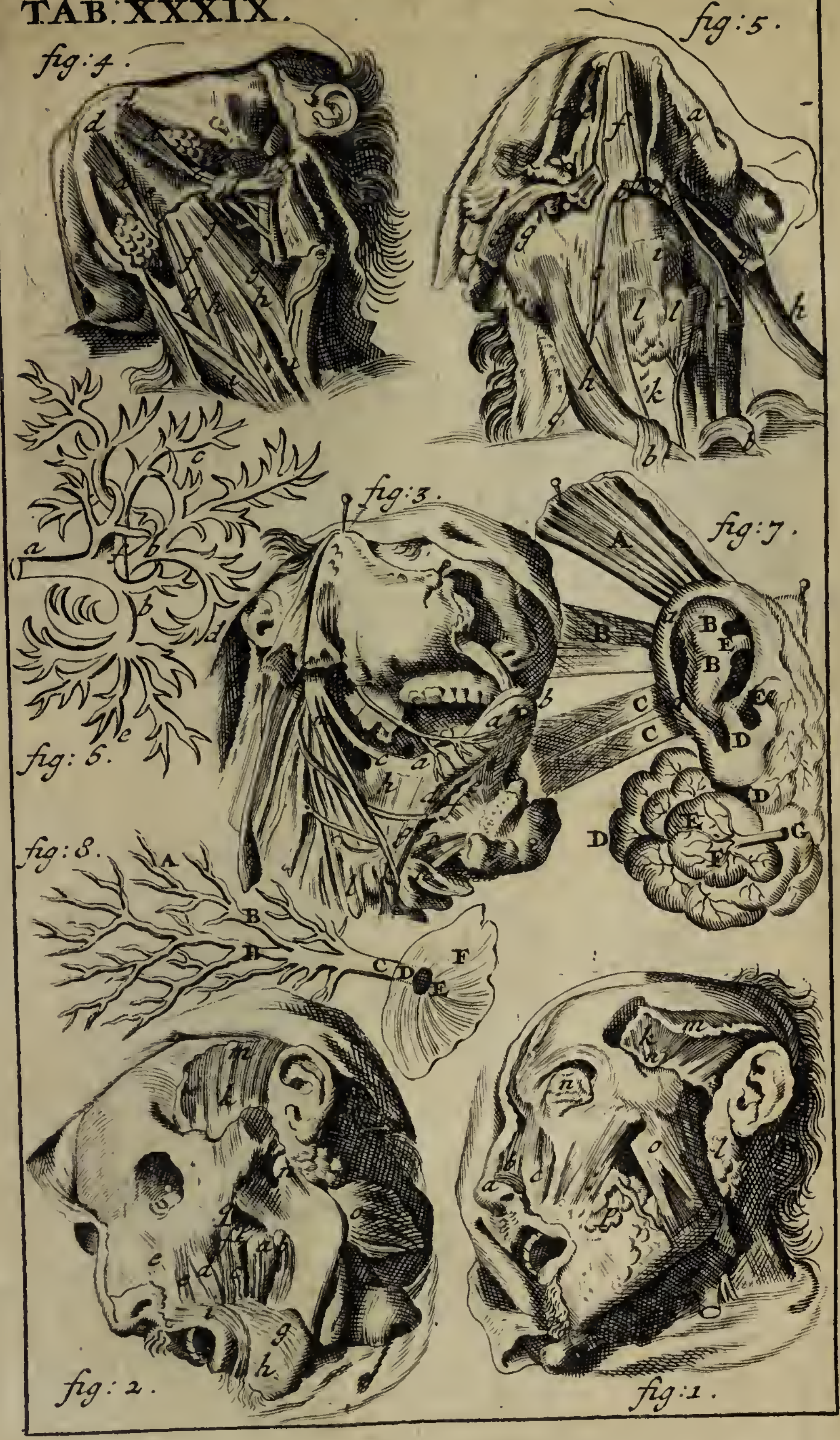
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fig: 5.
fig: 3.
fig: 7.
fig: 6.
fig: 8.
fig: 2.
fig: 1.
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TAB: XL.

fig: 4.

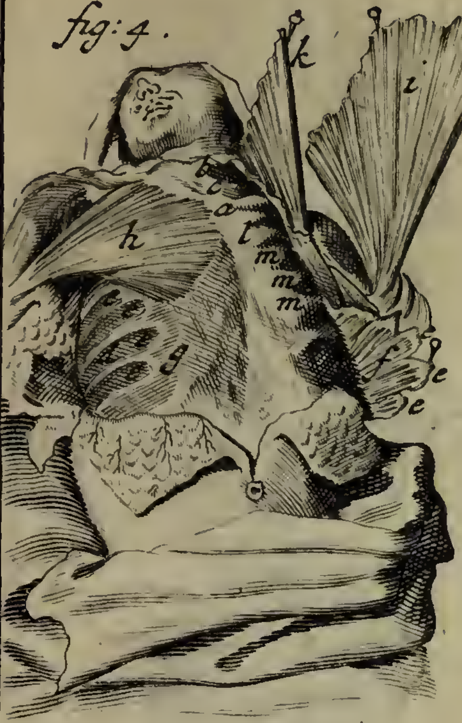
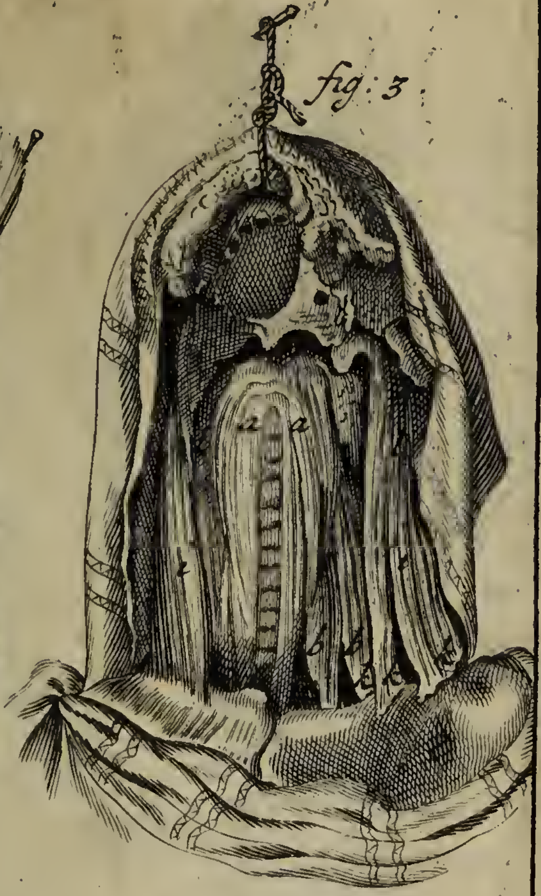


fig: 3



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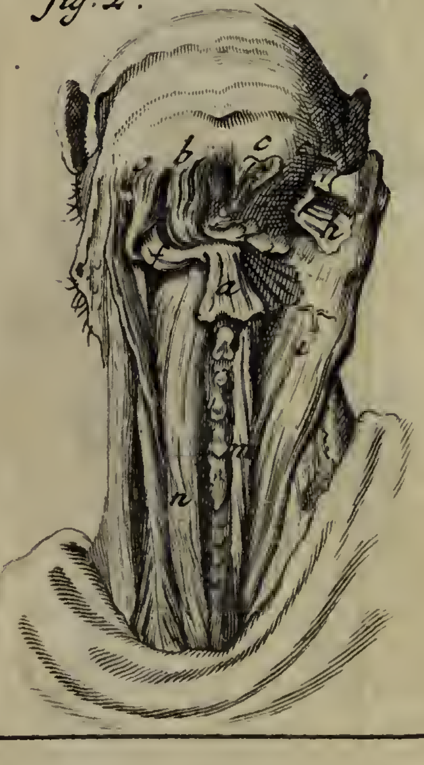

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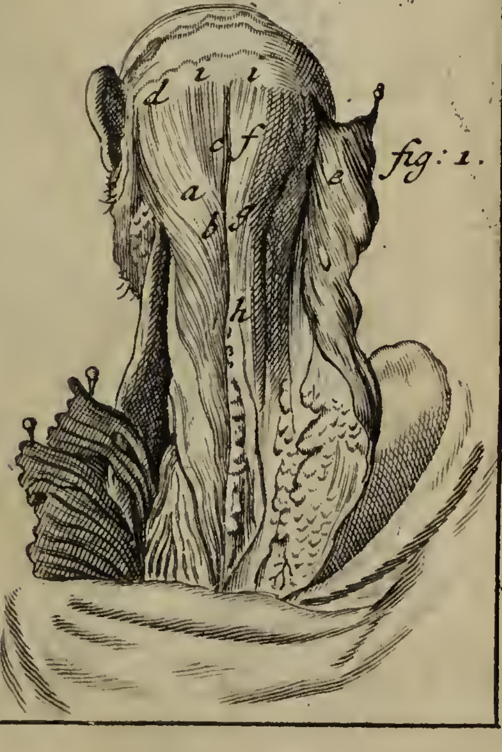

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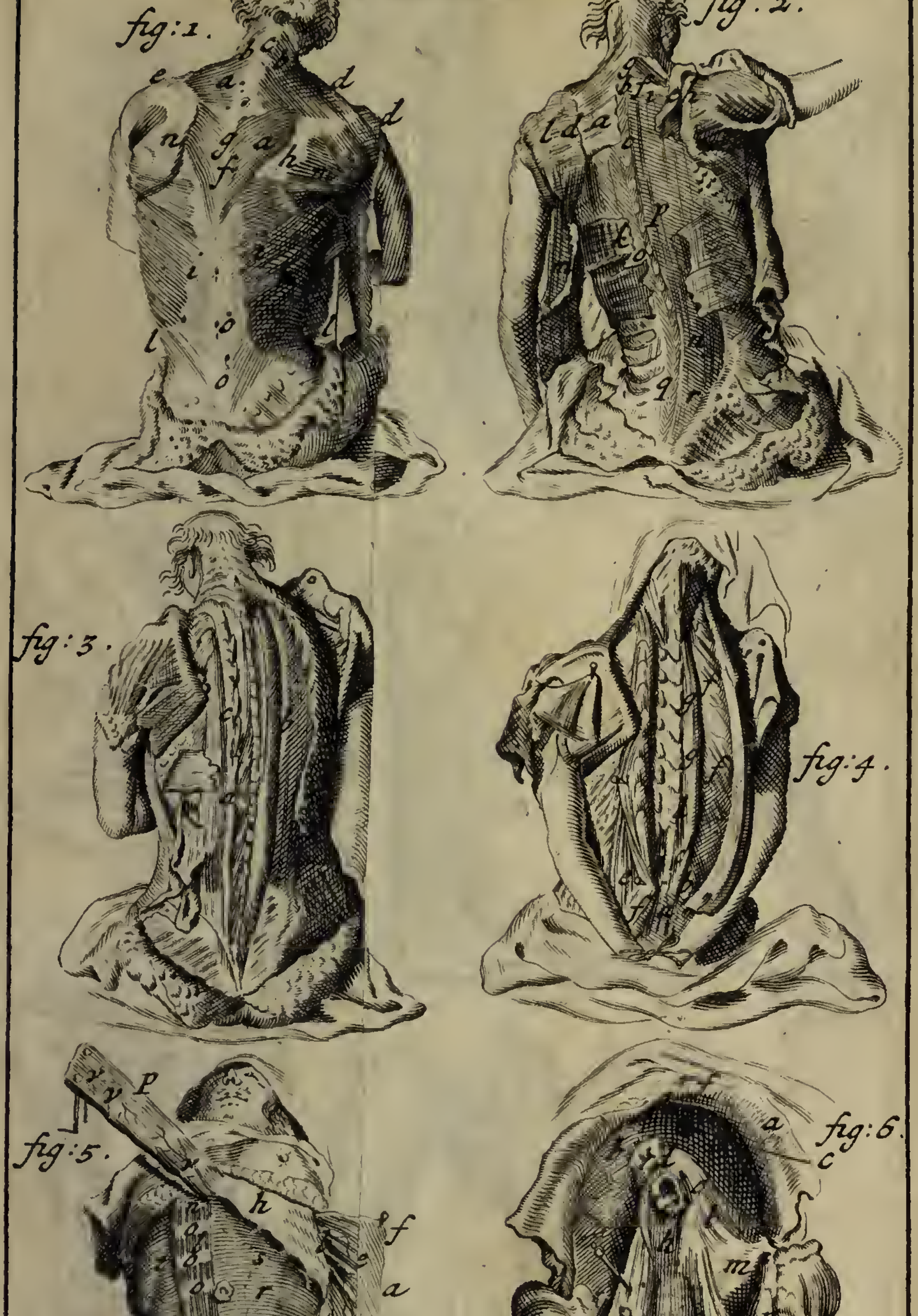
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fig:3.
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fig:4.
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fig:5.
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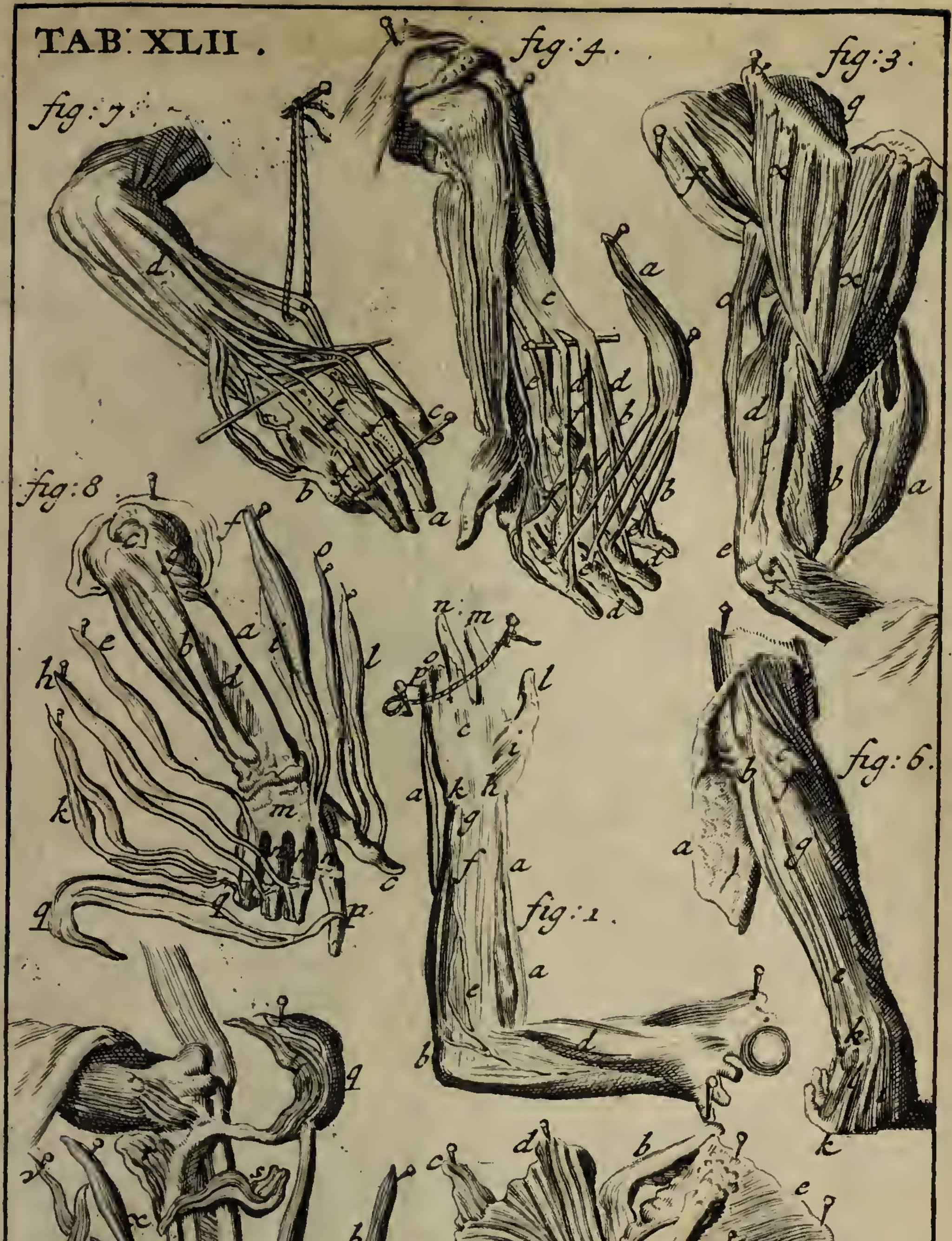
TAB: XLII.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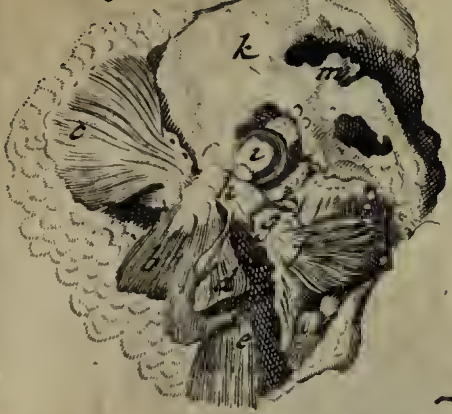
TAB: XLIII.

fig: 3.



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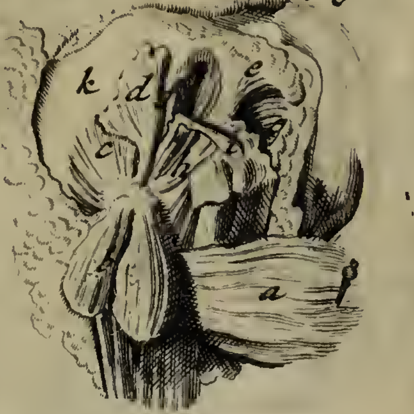

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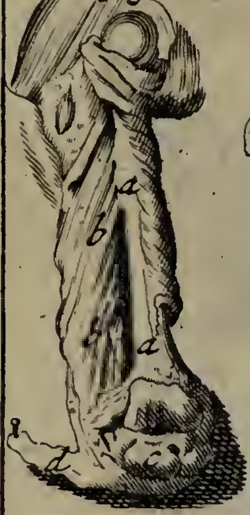

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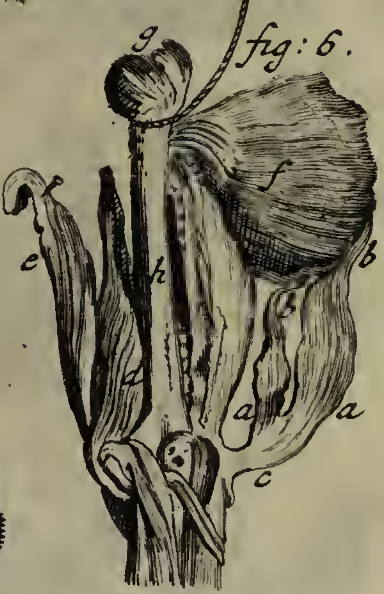

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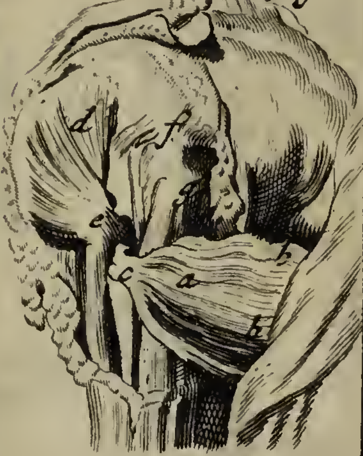

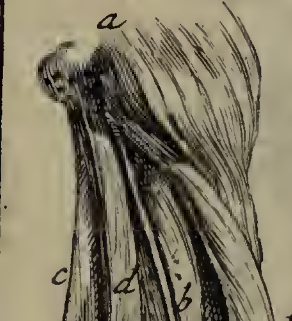

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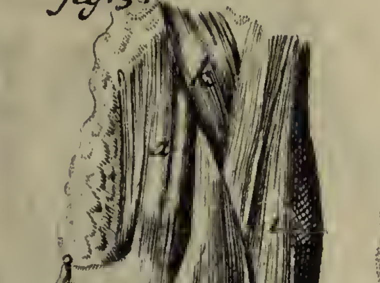

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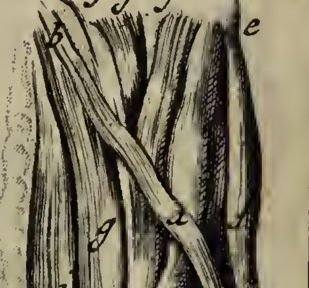

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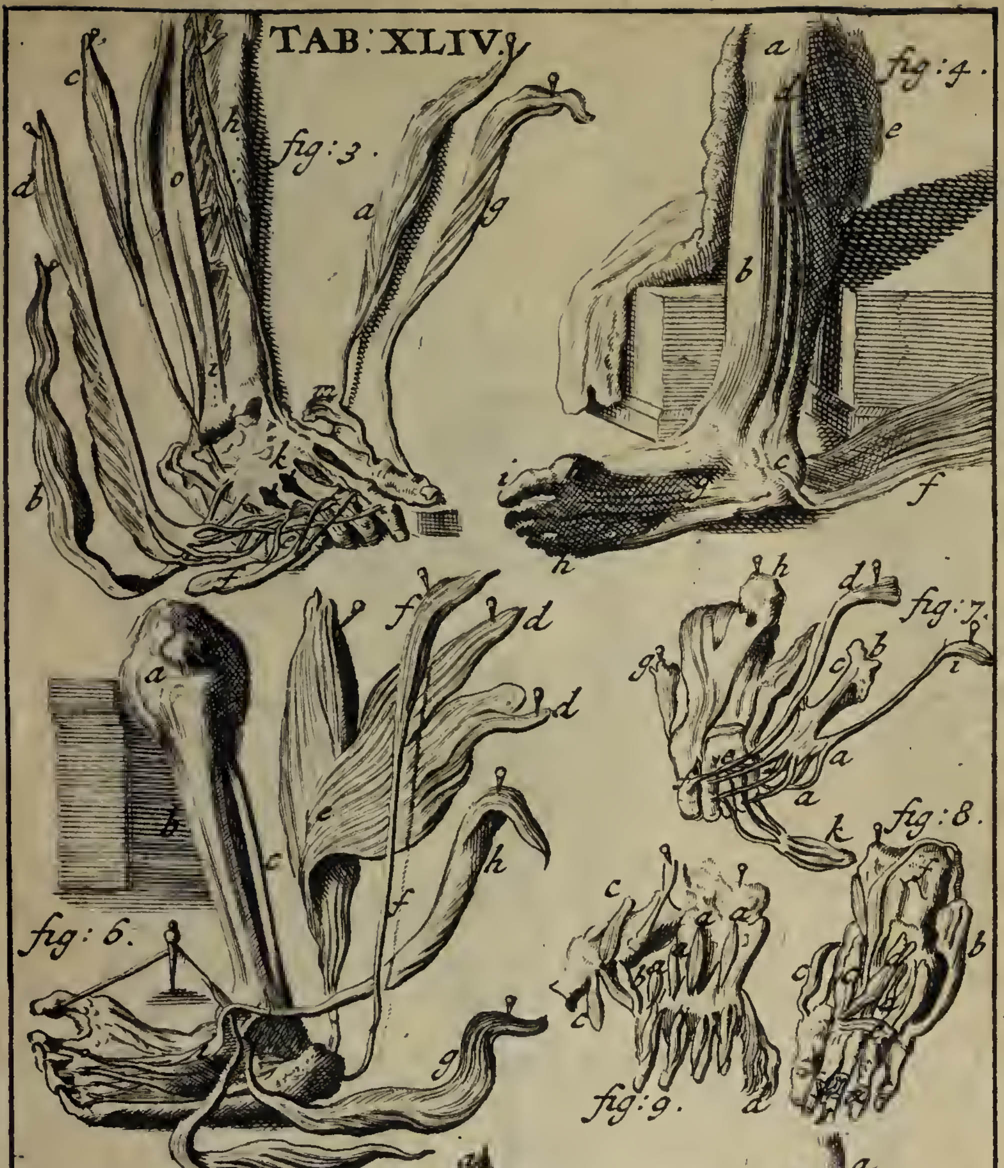

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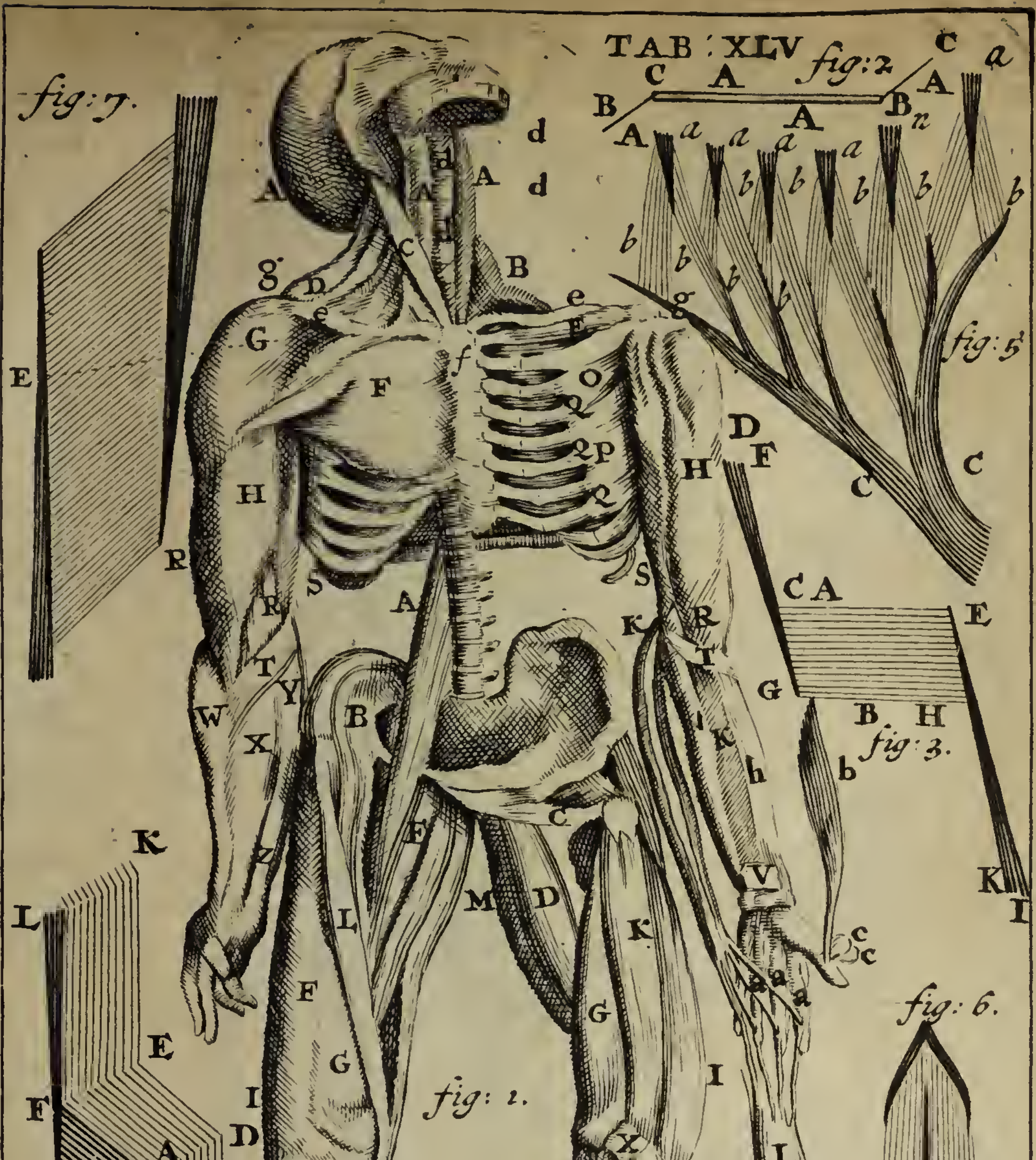

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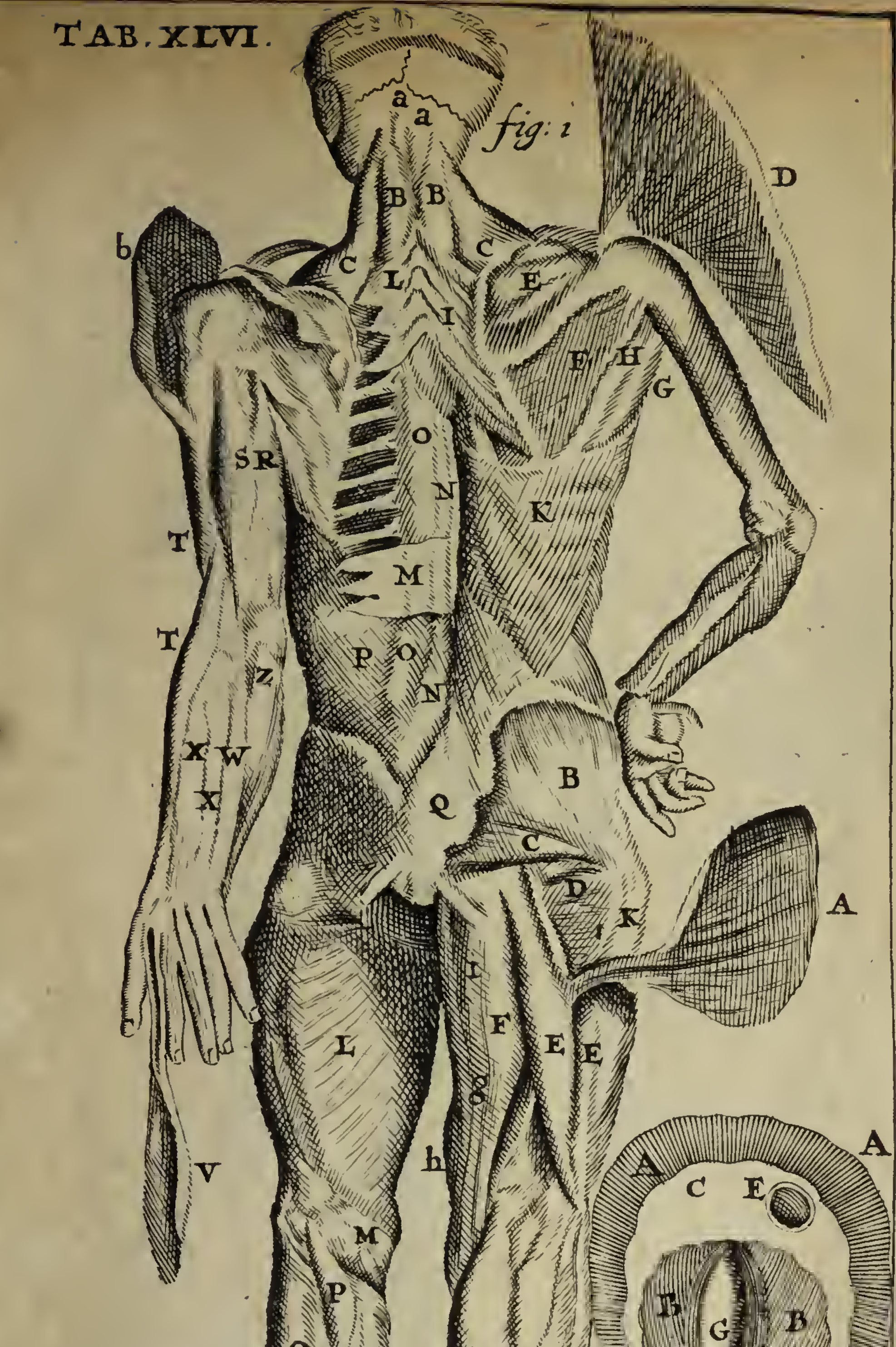
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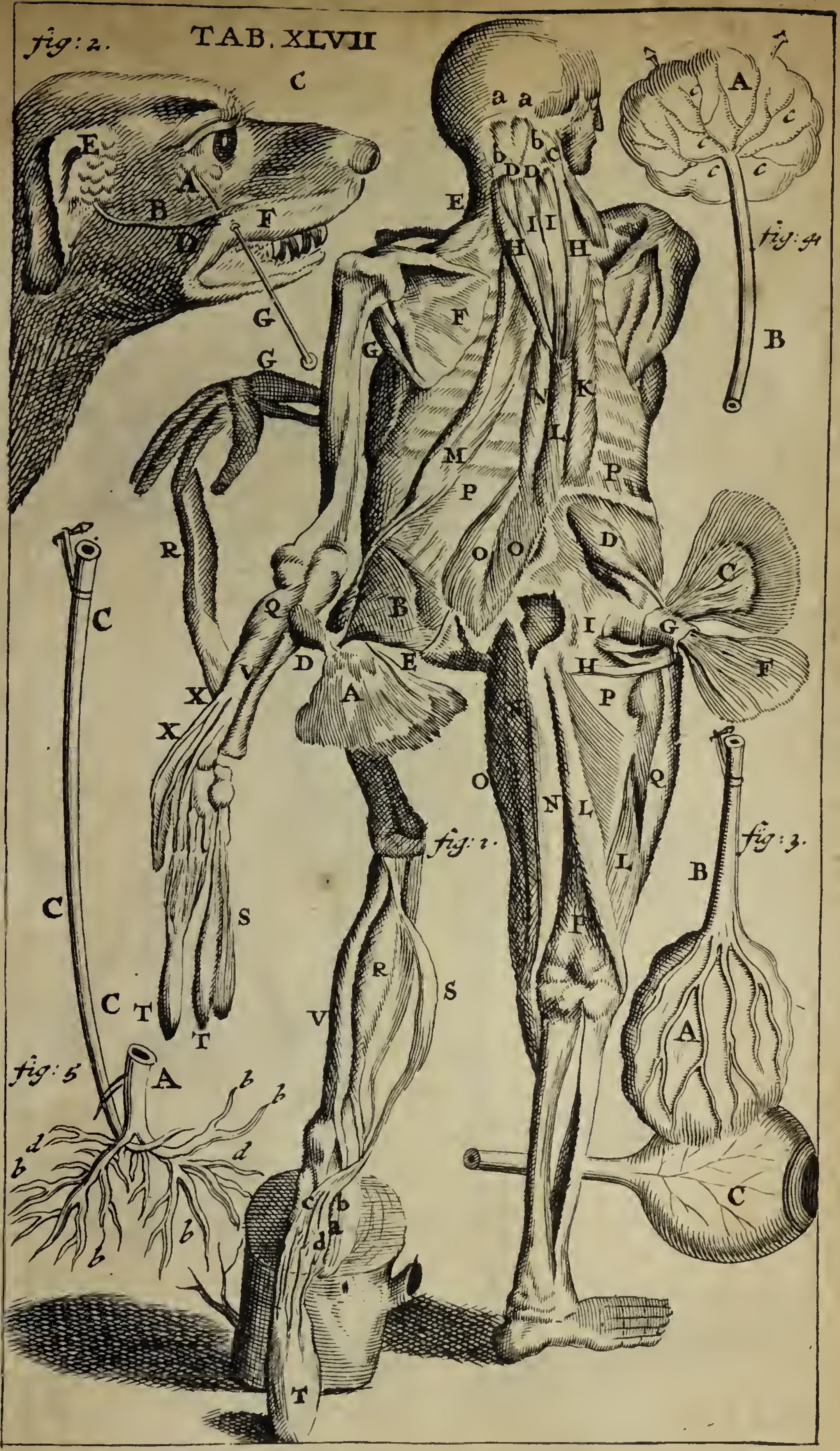
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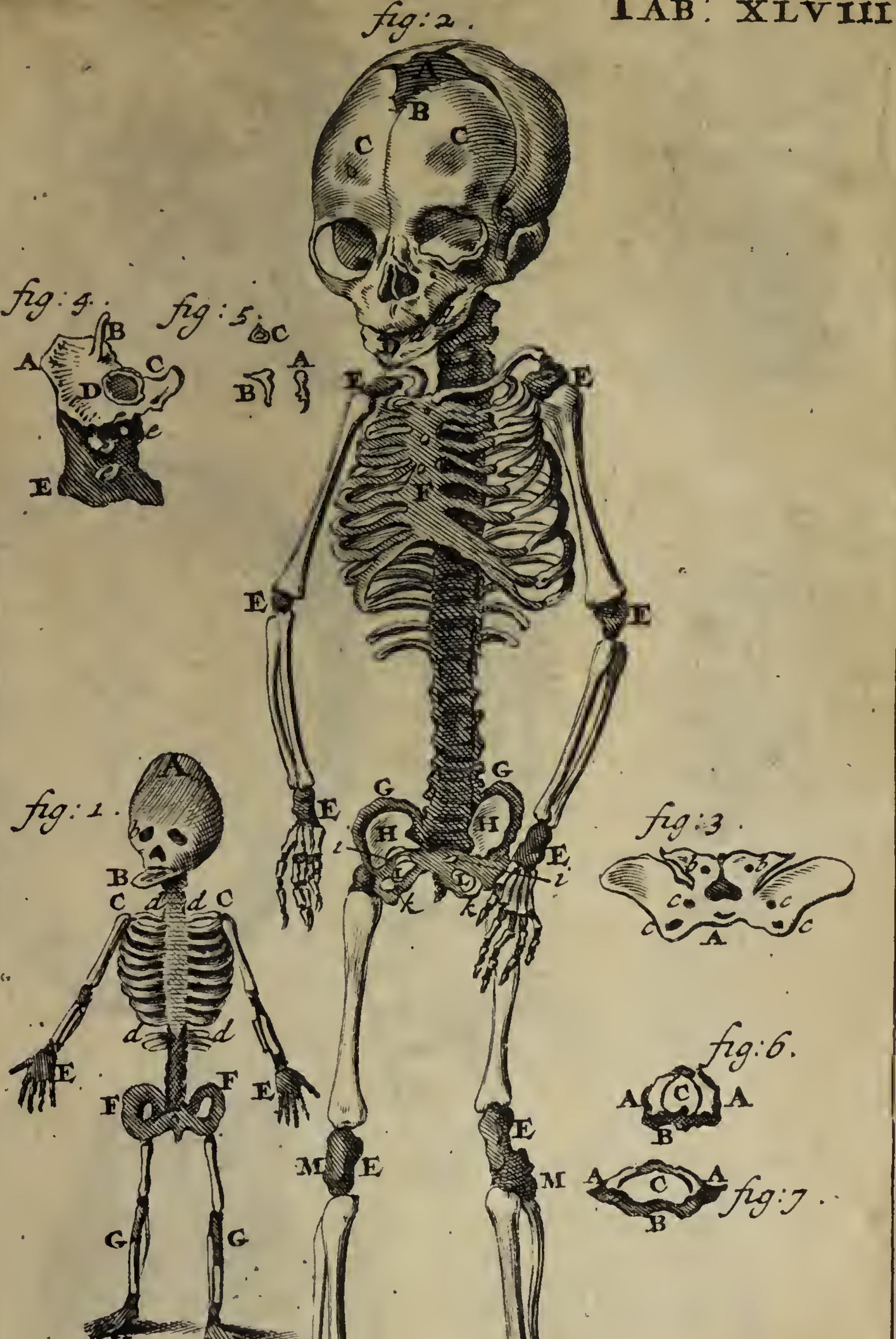
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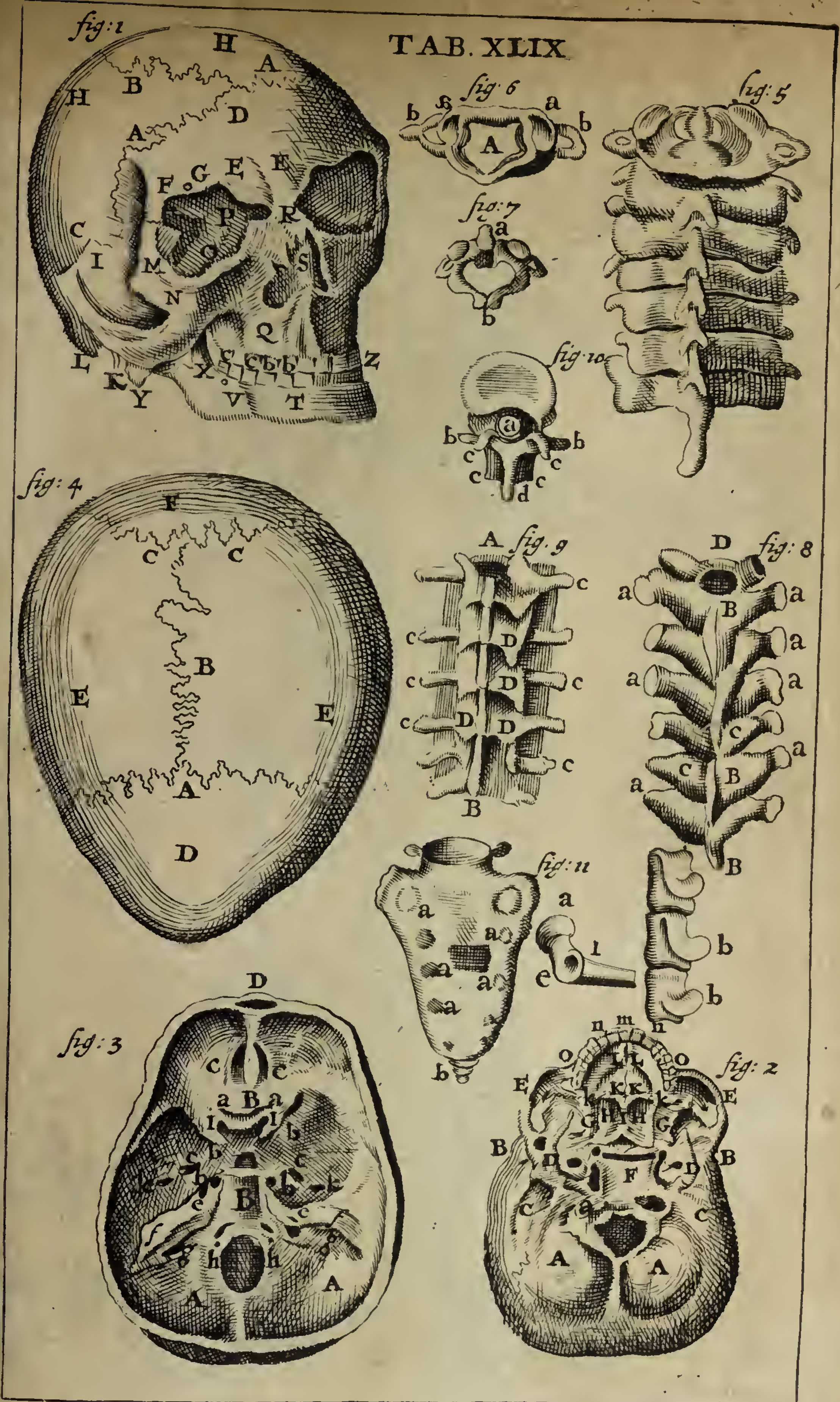
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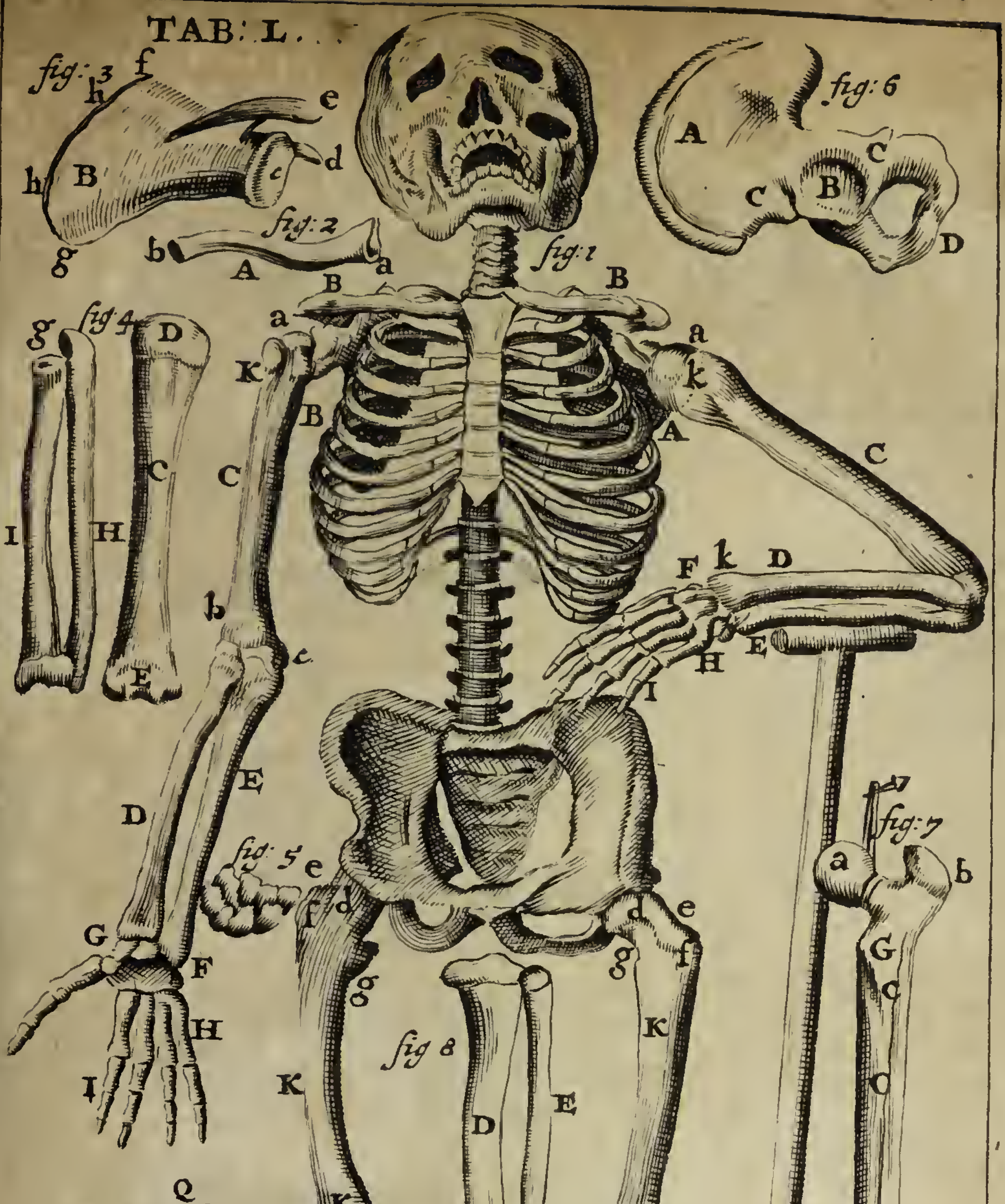

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APPENDIX.

TAB. I.

FIG. III. *From* Tho. Bartholin; *the reſt from Dr.* Lower.

FIG. I.

SHews the *left Ventricle* of the Heart with the *Trunk* of the *Vena Pulmonalis* opened on the back part, and expanded. *N. B.* this Figure is revers'd in this Print.

aa, The *Margin* of the *Vena Pulmonalis*, as it appears, when its *Trunk* is cut off and expanded.

bb, The left *Auricle* of the Heart.

c, The *Foramen Ovale*, by which the Blood in the *Fœtus*, and ſometime after the Birth, paſſes from the right Auricle into the *Vena Pulmonalis*, and afterwards into the left Ventricle of the Heart.

dd, The two Mitral Valves which hinder the Blood from paſſing back into the *Vena Pulmonalis* when the Heart is in *Syſtole*.

ee, The *Columnæ carneæ* which appear on the ſides of the left Ventricle, and are Muſcular Bodies with tendinous Fibres, faſtned to the lower Margins of the Mitral Valves *d d*, whereby thoſe Valves are hindred from riſing, leaſt the Blood ſhould return into the Pulmonick Vein, when the Heart is in *Syſtole*.

F, The *Baſis* of the Heart where the Blood paſſes from the Pulmonick Vein into the left Ventricle.

G, That part of the left Ventricle, which leads into the *Aorta*, behind the Mitral Valve.

H, The Cone of the Heart.

II, The Contexture of the Carnous Fibres in the left Ventricle.

FIG. II.

The inſide of the right *Auricle* of the Heart, alſo revers'd in this Figure.

aaa, The *Baſis* of the Auricle where it is united to the Tendon at the *Baſis* of the Heart.

bbb, Its Tendinous Circle next the *Vena Cava*.

ccc, The fleſhy Fibres which terminate in the two Tendons, *a*, *b*.

d, The Orifice of the great Coronary vein of the Heart.

ee, Two other Orifices of leſſer Veins of the Heart, which bring the Blood back from the Heart, and the *Parietes* of its Auricles and Trunks of the Blood, Veſſels near the *Baſis* of the Heart.

ff, The upper part of the Auricle.

FIG. III.

Shews the Heart cut tranſverſly, ſo that both the Ventricles appear diſſected; this Figure is alſo revers'd in this Print.

AA, The *Baſis* of the Heart.

B, The right Auricle.

C, The left.

D, That part of the Heart next its *Cone* cut off.

EE, The right Ventricle of the Heart.

FF, The left.

GG, The *Septum* which parts the two Ventricles.

H, The Fat on the *Baſis* of the Heart.

FIG. IV.

Shews the Inſertions of the Fleſhy Fibres of the Heart into the Tendons about the Orifices of the great Veſſels.

a, The *Mouth* of the right Ventricle which recieves the Blood from the *Vena Cava*:

b, *That*, by which the Blood is expell'd into the Lungs.

c, The *Oſtium*, by which the right Ventricle receives the Blood from the Lungs.

d, The Orifice, by which the Blood is expell'd into the *Aorta*.

ffff, The fleſhy Fibres which come from the external Surface of the Heart, and end in the Tendons of its *Baſis*.

ggg, The internal Fibres of the Heart, which take a different courſe from the external, and end in the ſame Tendons.

FIG. V.

Shews the Outmoſt Carnous Fibres of the right Ventricle, which paſs ſtreight up.

AA, The *Baſis*.

B, The *Cone* of the Heart.

CCC, The ſtreight Fibres which paſs from the *Baſis* of the Heart.

FIG. VI.

The Fleſhy Fibres, aſcending from the right ſide towards the left, and are placed under the former.

A, The *Baſis* of the Heart.

B, It's *Cone*.

C, The Fibres of the right ventricle.

D, Thoſe of the left.

E, The Tendinous Sinus between the two Ventricles, in which the large Trunks of the Coronary veſſels paſs.

FIG. VII.

The Fibres paſſing obliquely, from the right ſide of the Heart towards the left.

A, The *Baſis* of the Heart.

B, The *Cone*.

C, The right ſide.

D, The left.

E, The Fleſhy Fibres of the right Ventricle, ending in the Tendon *G*.

F, The Fleſhy Fibres alſo of the left Ventricle, paſſing into the ſame Tendon *G*.

FIG. VIII.

Some of the ſhort Fibres, which do not paſs from the *Baſis* of the Heart to the *Cone*, but about the middle of the ſides of the Heart are preſently inflected, and end in the Tendon of the other ſide, and in the Ventricle, in an oblique manner.

A, The Tendon about the Mouth of the right Ventricle.

B, The Tendon about the Mouth of the left Ventricle.

C, The Fibres continued from one Tendon to the other, with their intermediate Fibres which here and there mutually paſs from one to the other.

D, That part, where after they have paſt the right Ventricle, they are turn'd back, and end obliquely in the Tendon of the left Ventricle.

FIG. IX.

The external Fibres of the left Ventricle, as they ariſe in a ſpiral manner from the left ſide of the Heart, and bending towards the left, are fix'd in the *Baſis* of the Heart.

A, The *Baſis* of the left Ventricle.

B, The *Cone*, where the fleſhy Fibres ſeem to be turn'd in, or back again.

CC, The Fibres aſcending obliquely towards the *Baſis*.

D, The ſide next the right Ventricle.

E, The left ſide.

FIG. X.

The manner of the Contorſion of the Fibres.

A, The Tendon of the right ſide.

B, The Tendon of the left.

C, Some Fibres, as they paſs on the out-ſide of the Heart.

D, The Fibres, as they march on the inſide of the Ventricle.

E, The Contorſion of both orders of Fibres about the *Cone* of the Heart.

FIG. XI.

AAAA, The external Fibres, meeting in the *Cone*, in a ſpiral manner, as at an *Axis*.

TAB.

TAB. II.

FIG. I. *After* Caſpar Bauhin, *the* II, III, IV, V, *and* VIth. *after* Bartholin; *the* VIIth. *from Dr.* Lower. *All which Figures are here revers'd.*

FIG. I.

SHews the conjunction of the *Vena Cava*, with the Vein of the *Lungs*, in a *Fœtus*.

A, The Body of the Heart.

B, The *deſcending* Trunk of the *Vena Cava*.

C, The *aſcending* Trunk.

DF, The *Arteria Magna*.

E, The *Axillary* Artery.

G, The *right* Auricle.

H, The *Anaſtomoſis* between the *Vena Cava*, and vein of the Lungs, called the *Foramen Ovale*, which is cloſed with a Valve, in the Adult.

FIG. II.

Repreſents the *Canalis Arterioſus*, between the *Arteria Pulmonalis*, and great Artery in a *Fœtus*.

A, The Heart.

B, The Trunk of the *Arteria Magna*.

C, A Portion of the great Artery which paſſes downwards.

D, The Artery of the Lungs ariſing from the Heart.

EE, The Arterious Canal between the Artery of the Lungs and *Aorta*.

FFG, The Trunks of the Arteries, which paſs to the Head, Arms, *&c.*

FIG. III.

The right Ventricle of the Heart, opened from the *Vena Cava*, to ſhew the 3 tricuſpid Valves, AAA.

FIG. IV.

The right Ventricle of the Heart, opened from the *Arteria Pulmonalis*, to ſhew the 3 ſemilunary Valves, B,B,B.

FIG. V.

The left Ventricle of the Heart, opened from the *Vena Pulmonalis*, to ſhew the two Mitral Valves, that at DD, being divided.

FIG. VI.

The ſame Ventricle opened from the *Arteria Magna*, to ſhew the 3 ſemilunary Valves, E,E,E.

FIG. VII.

Demonſtrates, why the Blood which comes from the Jugular Veins, does not deſcend into the *Vena Cava*, but goes into the right Auricle of the Heart.

A, The deſcending Trunk of the *Vena Cava*.

B, The aſcending Trunk.

C, A Tubercle, according to Dr. *Lower*, which hinders the Blood of the ſuperior Trunk from incommoding of that of the inferior, and directs it into the right Auricle and Ventricle of the Heart.

D, The right Auricle.

E, The *Foramen Ovale*, between the *Vena Cava* and *Vena Pulmonalis*, clos'd with a Valve.

FG, The Heart, with its Coronary Veſſels.

NB, This Structure of the Trunks of the *Vena Cava*, at their entrance into the right Auricle of the Heart, is peculiar to ſome Quadrupeds, and is not found in Humane Bodies; tho' Anatomiſts, after Dr. *Lower*, have generally aſcribed it to them.

TAB. III.

FIG. I. *From* Bartholin, IVth. *and* Vth. *from Dr.* Willis, VIth. *and* VIIth. *from* Kerkringius.

FIG. I.

ThePrincipalBranches of the *Vena Cava* freed from the whole Body, revers'd in this Copy.

A, The Trunk of the *Vena Cava*, below the Heart.

B, Its Trunk above the Heart.

C, Its Aperture into the right Auricle.

DD, The Subclavian branches.

ee, The *Venæ Mammariæ*, which deſcend under the Sternum.

f, The vein of the *Mediaſtinum*.

gg, The Cervical Veins.

h, The Vertebralls.

iiii, The external Jugulars.

kk, The internal.——

llll, The *Vena Azygos*.

mm, The *Intercoſtales Superiores*.

nn, The *Phrenicæ*.

oooo, The branches of the *vena cava* in the Liver.

p, The internal Scapulary.

q, The external.——

r, The ſuperior Thoracick branch.

s, The inferior.——

T, The *vena Cephalica*.

U, Its external branch.

x, The internal, which partly makes the *Mediana*.

zz, The *vena Baſilica*.

tt, Its firſt Trunk.

uu, The external branch of its ſecond Trunk.

ww, The internal branch of its ſecond Trunk.

xx, Its third Trunk, which makes the other part of the Median Vein.

yy, The *Salvatella*.

The following Characters are placed on Veins below the *Diaphragme* and *Liver*.

AA, The *Emulgentes* or *Renales*.

BB, The Spermatick Veins.

cc, The Veins which ariſe from the *Capſulæ Renales*.

dddd, *Venæ Lumbares*.

EE, The Iliac branches.

ff, The ſuperior branch from the Muſcles.

gg, The veins of the *Os Sacrum*.

HH, The external Iliac branch.

II, The internal.

kk, The middle branches from the Muſcles.

LL, The Epigaſtrick veins.

mmm, The Hypogaſtrick.

nn, The lower branches from the Muſcles.

o, The *vena Pudenda*.

PP, The crural Trunk.

Qqq, The *vena Saphæna*.

rr, The leſſer Iſchiatick vein.

Sss, The veins ariſing from the Muſcles.

tt, The *Poplitæa*.

uu, The *Suralis*.

xx, The greater Iſchiatick vein.

FIG. II.

Part of the Trunk of the great Artery, turn'd inſide out.

AA, The internal Nervous Tunick, which perhaps is ſomewhat muſculous, conſiſting of ſtreight or longitudinal Fibres, which ſerve to ſhorten the tube of the Artery.

B, The muſculous Tunick, conſiſting of muſculous Fibres, which contracting, drive on the Blood.

cc, The glandulous Tunick, which (like that of the Inteſtines) is placed under the muſculous, and is compoſed of innumerable ſmall Glands.

D, The external vaſculous Tunick, or veſiculous, which is made up with Blood Veſſels and Nervous Fibres, variouſly complicated and contorted like Network.

FIG. III.

The Trunk of a large vein diſſected.

AA, The external Tunick (which is ſomewhat muſcular) conſiſting of Nervous Fibres, that are extended according to its length, altho' their *Series* is not regular.

BC, The vaſculous and glandulous Tunick, like that of the Artery.

D, The internal muſcular Tunick, compoſed of circular Fibres, like that of the Artery, which, by their contraction, ſerve to haſten the return of the Blood to the Heart.

FIG. IV. and V.

Shew the Membranes of the *Wind-pipe*, ſeparated from each other.

D, The external Membrane which is partly Cartilaginous, and partly Muſcular; the tranſverſe or annular Fibres of which, are placed in the *Interſtitia* of the Cartilages, and tye them together.

AA, The Glandulous Membrane, and BB, the vaſculous, which is thought, by ſome, not to differ from that of the Blood-Veſſels, and Inteſtines.

C, The internal Tunick, with ſtreight muſcular Fibres.

FIG. VI. and VII.

Part of the *vena cava*, open'd to ſhew the Pyriformal Valves (AA) placed at the Orifices of the veins, at their entrance into the *cava*.

FIG. VII.

BB, The Pyramidal Valves in the *vena cava* of an Horſe.

TAB.

TAB. IV.

FIG. I, II, *and* III. *from* Dr. *Willis*; *the* IVth. *from* Dr. *Lower*; *the* Vth. *and* VIth. *from* Bartholin; *the reſt from* Kerkringius.

FIG. I.

SHews the communication between the Lateral *Sinus*, and internal Jugular Vein on one ſide, with the *Diverticulum.*

A, The Lateral *Sinius* deſcending.

B, That part of the *Sinus* where it paſſes out of the Skull, and begins to dilate it ſelf into the Bulbous part.

C, The Bulbos part, call'd *Diverticulum*, at the beginning of the internal Jugular; which is receiv'd in a peculiar Cavity on the *Baſis* of the Skull, and ſerves as well to divert the quick deſcent of the Blood, as prevent its regurgitation from the internal Jugular Vein into the *Sinius* in Coughing, *&c.*

D, The beginning of the Jugular Vein.

FIG. II.

Shews the Vertebral Veins; with the upper part of the *Sinus Vertebralis*, and the communication between them and the Lateral *Sinus* and Jugulars; as alſo all the Divarications of the ſpinal *Sinus.*

A, The third *Sinus* of the Head, called *Longitudinalis* cut off, where it paſſes into the Lateral *Sinus.*

BB, The Lateral *Sinus.*

CC, The *Diverticulum*, where the Lateral *Sinus*'s end in the Jugular Veins.

DD, The Jugular Veins.

E, The upper communications of the vertebral *Sinus.*

FF, The *Sinus vertebralis* on both ſides within the *Cranium*, communicating with the Lateral *Sinus.*

GG, The Trunk of the vertebral Veins on both ſides, which empty themſelves into the Subclavian Veins.

hhh, The *Anaſtomoſis* on both ſides, lying on the Articulations of the Vertebra, between the Vertebral Vein and *Sinus.*

i,i,i, Small Veins which lie on the fore parts of the *Vertebræ*, and communicate between the two vertebral Veins.

KK, The Communications of the *Sinuſes*, and all the Veins on the top of the Spine.

LL, Two Venous Ducts, by which the laſt mentioned communications are made.

mm, The commiſſures of the *Sinus's*, on both ſides, according to the *Internodia* of the *vertebræ.*

nn, The venous Ducts, which carry the Blood from the ſpinal Marrow into the *Sinus.*

ooo, The Veins which bring Blood into the vertebrals from the Muſcles of the Neck, cut ſhort.

pp, OtherVenous Ducts likewiſe, which are continued with the *Vena Azygos*, and lumbal branches of the *vena cava*, by which, if Wax or Wind is injected into the Trunk of the *vena cava*, below the Diaphragme, either will paſs (as it were) back again into the *vena Azygos* and lateral *Sinus's*, within the Skull.

FIG. III.

Shews the Trunk of the Carotid Artery, before it enters the Surface of the Brain, NB. The Contortions of this Artery differ very much in a Humane Body, from what is repreſented in this Figure; which appears to be done from the Carotid Artery of ſome Quadruped.

A, The Trunk of the Artery, aſcending towards the *Cranium*.

B, The ſame, whilſt it is incloſed within the Bone, and covered with its borrowed Coats.

BC, The bending of the Artery, within the *Sinus* of the Skull, repreſenting a double turn'd S.

D, The Trunk of it paſſing towards the Brain.

EEE, The Membrane incloſing the Artery in the *Sinus* of the Skull.

FIG. IV.

This Figure is here revers'd.

AAA, The aſcending Trunks of the Arteries which paſs to the Head and Arms.

B, The Bending Trunk of the *Aorta*.

C, The Orifices of the aſcending Trunks of the Arteries, looking towards the Heart, the better to receive the Blood impell'd from thence, before it paſſes into deſcending Trunks.

D, The deſcending Canal of the *Aorta*.

FIG. V.

The ſingle valves that appear looking upwards, in the *Baſilick* vein.

FIG. VI.

Shews the double valves, which appear in the Crural vein, when open'd.

FIG. VII.

Shews the valves of the Jugular veins.

A, The Humane Jugular vein.

B, A three fold valve, where it joins with the Subclavian vein.

C, Another three-fold valve, near the former.

D, A third three-fold valve, three Fingers diſtance from the ſecond.

FIG. VIII.

A, The Jugular vein opened to ſhew the three valves.

bbb, The three valves.

FIG. IX.

A, The three valves in the Jugular vein of a Boy.

TAB.

TAB V.

FIG. I.

THis monſtrous Figure of the Arteries of a Humane *Fœtus*, is Copy'd from *Bidloo*; but revers'd in this Print by *Blancard*, whoſe Deſcription take as follows.

A, The beginning of the Great Artery, ariſing from the Heart.

a, The aſcending Trunk, from which ariſes CC, the Subclavian Arteries, dd, the *Carotides*, which again produce ee, the external branch; ff the internal branch. gg, The vertebral Arteries, or Cervical. hh, The *Muſculæ*. ii, The *Mammariæ*. kk, The *Intercoſtales ſuperiores*. ll, The internal *Scapulary*. mm, The external. nn, The ſuperior Thoracick branch. oo, The inferior. pp, The Axillary branch. Qqq, Its ſuperior branch, paſſing along the Arm, to the *Carpus*. Rr, Its inferior branch, paſſing in like manner to the Hand.

The following Characters are placed on the Arteries, which ariſe from the deſcending Trunk.

B, The deſcending Trunk of the Artery. aaa, The inferior Intercoſtalus. b, The Artery *Phrenica*. C, *Arteria Cœliaca*; d, Its right branch: e, Its left branch or *Arteria Splenica* diſpers'd with ſmall branches thro' the Spleen. f, The right Gaſtrick Artery. g, The *Gaſtro-Epiploica*. h, The *Arteria Epiploica*. kk, The *Arteria Meſenterica* ſuperior. ll, The *Arteriæ Renales*. mm, *Teſticulares*. nn, *Lumbares*. oo, The inferior Meſenterick Artery pp, The branches of the Iliac Arteries. QQ, The external Iliac. rr, The internal. s, The *Arteria Sacra*. tt, The *Hypogaſtrick*, which paſs to the *Rectum*, and the *Pudenda*. vv, The Hypogaſtricks which go to the *Uterus*. xx, The Umbilical Arteries. zz, The Epigaſtricæ. cc, The *Arteriæ Pudendæ*. ii, The Arteries that paſs to the Muſcles. uu, The Arteries of the external Muſcles of the Thigh. ww, Thoſe of the internal Muſcles. xx, A branch of the *Arteriæ Popliteæ*. yy, Thoſe of the Calf. NN, The branches which go to the Feet and Toes.

FIG. II.

Shews the Similunary Valves of the *Aorta*, and the paſſing out of the Coronary Arteries of the Heart; from Dr. *Lower*.

A A, Part of the left Ventricle of the Heart open'd.

bbb, The three Semilunary Valves, expreſs'd very looſe, as when the Blood paſſes out of the Heart.

C, The Trunk of the *Aorta* open'd.

dd, The Orifices of the two

Coronary Arteries, immediately without the Valves.

ee, The root of the *Aorta*, where it is united with the Tendon of the Heart.

FF, The Mitral Membranes divided, and brought forwards on each ſide.

FIG. III.

Shews the Semilunary Valves, as they appear when they hinder the return of the Blood from the *Aorta*; by Dr. *Lower*.

AA, The *Aorta* cut off next the *Baſis* of the Heart.

BBB, The three Semilunary Valves, mutually touching each other.

CC, The two Coronary Arteries.

FIG. IV.

Shews the manner how the Carotid and Vertebral Arteries, aſcend into the Skull, from Dr. *Lower*.

AA, The two Carotid Arteries, where they enter the Bone of the Skull.

BB, That part of them, which is incloſed in the Body of the Bone.

CC, Thoſe parts which paſs by the ſides of the *Sella Turcica* before they reach the Brain.

DD, The Vertebral Arteries where they paſs into the Skull.

EE, Their Union into one Trunk, which is again divided and joined by ſmall branches with the Carotids.

TAB VI.

Both from Kerkringius, *but revers'd in theſe Prints.*

FIG. I.

THE Ramifications of the *Vena Porta*, within the Liver.

A, The place where the *Vena Porta* enters the Liver, ſhewing its *Foramen*, when cut from its other part.

BB &c, The five principal great baanches of the *Porta*, within the Liver.

C, The Umbilical Vein turn'd into a Ligament.

D, The *Canalis Venoſus*, between the *Vena Porta* and *Cava*, alſo turn'd into a Ligament.

EEE, The Extremities of the Capillary Veins.

FIG. II.

The Ramifications of the *Vena Cava* within the Liver.

A, The Trunk of the *Vena Cava*.

B, Part of the Diaphragm.

CCC, The three chief branches, which are again divided into others.

DDD, The extremities of the Capillary veins.

TAB.

TAB. VII.

From Kerkringius.

FIG. I.

THE vein of the Lungs, fill'd with Wax.

A, The Trunk of the vein of the Lungs, cut off near the left Auricle of the Heart.

BB, Its two Trunks which paſs to the right and left Lobes of the Lungs.

CC, Their Capillary extremities.

FIG. II.

The Pulmonick Artery, alſo fill'd with Wax, and freed from the Lungs.

A, Its Trunk next the Heart, BC, as in the preceding Figure.

TAB. VIII.

FIG. I. *From* Bidloo. *The* IVth. Vth. VIth *and* VIIIth. *from Dr.* Willis; *the reſt from* Veſlingius.

FIG. I.

THE veſſels of one of the Lobes of the Lungs laid bare.

A, The Artery, B the vein, C the *Trachea*, lying between them.

FIG. II.

AB, The back part of the *Cartilago Arytænoides* joined with the *Anularis*, not well expreſs'd.

C, The back part of the *Anularis*.

FIG. IV. V. *and* VI.

Shews the Blood veſſels and *Bronchus* of one of the ſmall Lobes of the Lnngs, ſeparated from each other.

FIG. IV.

A, The Trunk of the *Trachea*, cut from the Wind-pipe, in whoſe Surface the Annulary Cartilages appear.

B, Leſſer branches ariſing from the Trunk, in which alſo the *Annuli* appear.

C dd, The little round Air-Bladders, hanging at the end of thoſe branches, like Grapes to their Stalk.

EE, The Blood veſſels which ſerve for the Nouriſhment of the *Trachea*, and are diſtinguiſh'd from thoſe of the Lungs.

FIG. the Vth. The Pneumonick vein. FIG. VI. The Artery of the Lungs, which accompanies the *Trachea*, as expreſs'd, FIG. I.

FIG. VIII.

Shews part of the outward Membrane, which covers the whole ſubſtance of the Lungs, which by means of the multiplicity, and variety of veſſels terminating into it, ſeems in a manner punch'd thro' with innumerable little Holes, and by the windings of the Blood Veſſels, whoſe Capillaries running along its inner Surface, encompaſs the Globular Veſicles, divided into a multitude of irregular Squares of unequal ſides.

FIG. IX.

Shews a Portion of the external Membrane, ſeparated with the broken off-cluſters of Veſſels, and without the ſquares, only with the ſmall Cells(which are the divided Air Bladders) and appear againſt the Light as if prick'd through.

FIG. X.

The external Face of the *Thyroide*, or *Scutiform* Cartilage.

FIG. XI.

Shews the back part and ſuperior Surface of the *Cricoides*, or Ring-like Cartilage.

FIG. XII.

The Arytenoidal Cartilages.

FIG. XIII.

The *Epiglottis*.

FIG. the XIVth. is done for the fore-part of the *Larynx* with its Muſcles, all which are ſo very ill expreſs'd, as well as the ſame parts (as is pretended) on the back part of the *Larynx*. FIG. XV. and will rather confound than inform the Learner; wherefore we ſhall paſs them by.

FIG. XVI.

The *Thyroide* Cartilage, together with its Muſcles.

A, The *Cartilago Scutiformis*, or *Thyroides*.

bb, The *Muſculi Hiothyroides*.

CC, The *Sterno Hioides*.

dd, The ſmall Muſcles call'd *Cricothyroides*.

TAB.

TAB. IX.

From Dr. Willis.

FIG. I.

THE Lobe of the Lungs of a Quadruped (it differing very much in Figure from the Humane) in whoſe Surface the Lympheducts are here expreſs'd, tho' I think a little too hard.

A, The Orifice of the *Trachea*, as it appears when divided, it being placed between the two Blood Veſſels.

B, The Orifice of the Subjacent Pneumonick Artery.

C, The Orifice of the Vein of the Lungs placed above.

ddd, The external Lympheducts, diſpers'd on the Surface of this Lobe.

eee, Divers of thoſe Lympheducts, meeting on the back of this Lobe, from whence they paſs into the *Ductus Thoracicus*

FIG. II.

Shews one Lobe of the Lungs of a Sheep divided through the middle, and the upper part remov'd (in which is the Trunk of the Vein) and the Trunk of the Wind-pipe, freed and laid by; The Ramifications of the Artery of the Lungs, are here repreſented in all its diſtributions into the little, or leſſer Lobes, being firſt fill'd with a Tinctur'd Liquid.

AA, The lower half of the Lobe of the Lungs divided, in which the branchings of the Artery of the Lungs appear.

BB, The Trunk of the Pneumonick Artery of this Lobe.

C, The Hole after a conſiderable branch of it is cut off.

DDD, Its Trunks, whence other branches are cut off, which could not be expreſs'd in this Figure; they paſſing to the upper part of the Lobe which is here cut off.

EE, The Trunk of the Pulmonick Artery, paſſing according to the length of the Lobe, and emitting branches on both ſides, which paſs to the right and left.

FFF, The Branches and leſſer Shoots, which with the Veins every where accompany the *Bronchi*; and at length paſs beyond the *Bronchi*, and encompaſs the Orbicular Veſicles of Air, which they with their numerous extremities twine about.

GGGG, The Bronchial Branches cut from the Trunk of the *Trachea*, and remaining in the Lungs, where they are accompanied with the Blood Veſſels.

HHH, The Trunk of the *Aſpera Arteria* of this Lobe of the Lungs, on which the Pulmonick Artery lay, here freed from thence and laid aſide.

IIII, The

III, The *Arteria Bronchialis* of *Ruyſch*.

NB, That FF, &c. plac'd by the *Bronchi* of this laſt deſcrib'd Figure ought to be fff, according to Dr. *Willis*, ſhewing the Trunks of Branches of the *Bronchi*, which are partly thoſe repreſented cut off at GGG, and partly thoſe that paſs to the other part of the Lobe.

TAB. X.

FIG. II. *From* Fredrick Ruyſch, *the other from Dr.* Willis.

FIG. I.

SHews one Lobe of the Lungs, according to the Ramifications of the Wind-pipe, divided into little and leſſer Lobes, whoſe Veſſels with their branches were firſt fill'd with a Liquid, before the leſſer Lobes were ſeparated from each other.

A, The Trunk of the *Aſpera Arteria* cut off.

BBB, Its lower part open'd to ſhew the *Foramina* that lead into the ſeveral Branches, as well as its ſtreight Fibres.

aaa, The *Foramina* which lead into the branches.

bbb, The ſtreight Fibres, lying on the others, which are Circular.

CC, The upper part of the Trunk of the *Trachea* remaining intire, ſo that the Annular Cartilages appear.

DDD, The branches of the *Trachea* conſtituting the leſſer Lobes; alſo intire, ſo that the Annular Cartilages appear.

EE, Two of the branches ſlit open, to ſhew their *Foramina* and ſtreight Fibres.

FF, &c. The Trunks cut off, and their Branches remov'd to make room for the expanſion of thoſe that remain.

GGG, The Secondary little Lobes of the *Bronchi*, hanging by ſtalks, like *Grapes*, which may ſtill be divided into leſſer *Lobuli*; all which have Ducts from the *Bronchi*, that paſs into their Veſicular Cells.

H, The Blood Veſſels creeping on the Superficies of the *Lobuli*.

FIG. II.

The back-part of the Wind-pipe, with its branches, freed from the Lungs of a *Calf*.

A, The *Aſpera Arteria*, cut off below the *Larynx*.

B, Its branches of the right ſide of the Lungs.

c, Thoſe of the left.——

D, The Bronchial Artery, whoſe Branches accompany thoſe of the Wind-pipe to their extremities.

E, The hinder-part of the deſcending Trunk of the great Artery, where the Intercoſtal Arteries ariſe from it.

aa, The ſmall Trunks of the Intercoſtals cut off.

F, The upper Branches of the Wind-pipe, which is peculiar to ſome Quadrupeds, and not found in Humane Bodies.

FIG. III.

Part of the Pulmonary Lobe, in which, the Membranous *Interſtitia* are blown up, and all the little Lobes appear in their proper Figure; which does ſomewhat repreſent the Leaf of *Polypody*.

A, Part of the Wind-pipe, complicated with other Veſſels that come to that ſtalk, and compoſe little Lobes that grow like the Leaves of a Tree.

BB, The Lobes.

cc, The Blood-Veſſel creeping through them.

ee, The Membranous Interſtices of the Lobes, which have alſo Blood-Veſſels in them.

TAB. XI.

FIG. I. *From* Veſalius, *the* II. *from Dr.* Willis, *the* III. *from* Bidloo.

FIG. I.

SHews the Brain, after the top of the Skull is taken off, and the *Dura Mater* divided and left hanging down.

AAA, The right ſide of the Brain, partly ſeen covered with the *Pia Mater.*

BB, The third *Sinus* of the *Dura Mater,* call'd *Longitudinalis* open'd.

CCC, The Trunks of the Veins, which ariſe from the Brain, and empty themſelves into the laſt mentioned *Sinus.*

DDD, The turnings and windings on the Surface of the Brain, cover'd with the *Pia Mater.*

EE, The *Dura Mater* hanging down.

FIG. II.

The Brain lying on its Hemiſpheres, to ſhew its *Baſis.*

AAAA, The two fore-moſt, and two hind-moſt Lobes of the Brain.

BB, The *Cerebellum.*

CC, The *Medulla Oblongata.*

DD, The Olfactory Nerves, or firſt pair.

EE, The *Optick,* or ſecond pair.

FF, The *Oculorum Motorii,* or third pair.

GG, The Pathetick Nerves, or fourth pair.

HH, The fifth pair of Nerves.

II, The ſixth.

KK, The Auditory Nerves with their two proceſſes, *viz.* the hard and ſoft, counted the ſeventh pair.

LL, The eighth pair, call'd *Vagum,* conſiſting of divers Fibres.

MM, The Spinal Nerves, call'd *Acceſſorii,* which paſs out of the Skull with the *Par Vagum.*

NN, The ninth pair of Nerves compoſed of divers filaments, which paſſing down, unite into one Trunk, and marches out a little above the *Proceſſus Occipitalis.*

OO, The tenth pair of Nerves tending downwards.

PP, The Trunks of the Carotid Arteries cut off.

QQ, Their Branches marching between the Lobes of the Brain.

R, The fore-moſt branches of the Carotide Arteries, marching between the Anterior Lobes of the Brain.

S, The hind-moſt branches of the Carotids, joyning to the Vertebral Arteries with One Trunk.

TTT, The three Trunks of the Vertebral Arteries, deſcending towards the *Medulla Oblongata.*

U, Their conjunction into one Trunk.

WW, The Communicant branches, between the *Carotids* and *Vertebrals*, from whence ſmall Arteries aſcend to the *Plexus Choroides.*

X, The *Inſundibulum.*

YY, The two whitiſh Glands placed behind the *Inſundibulum.*

ZZZ, The *Protuberantia Annularis*, by ſome call'd *Pons Varolij*; which ariſing from the *Cerebellum* admits the *Medulla Oblongata* to paſs under it, as under a Bridge.

FIG. III.

The Cortical Glands of the Brain, together with the Fibres view'd with a *Microſcope.*

AA, Part of the Brain boyled.

BB, The *Dura* and *Pia Mater*, which *Bidloo*, after others, has divided into three Membranes.

CC, The Blood Veſſels, with their Capillary diſtributions and reticular *plexus*, DD.

EE, The various orders of the Cortical Glands.

FF, The Bundles of Tubes, going together, conſtituting the *Medulla.*

GG, The Lobes of the Bundles, or the ſeparations and branches, which are writhed in divers Angles, and turn'd in, and variouſly diſpos'd.

H, The complicated Tubes produced from theſe.

I, The Nerves, which compoſe the Medullary ſubſtance.

Thus *Blanchard* and *Bidloo.*

TAB. XII.

From Dr. Willis.

FIG. I.

SHews the external or ſuperior *Superficies* of the Brain, taken out of the Skull; The hinder Lobes (being freed from their Adheſions by the *Pia Mater* to the neighbouring Parts) are here raiſed and turned forwards, to ſhew the *Crura Medullæ Oblongatæ*, the *Fornix*, the *Nates*, and *Teſtes*, with the *Glandula Pinealis*, and other Proceſſes.

AA, The *Limbus* of the Brain, which in its natural Situation, was contiguous to the *Cerebellum*.

B, The Brim or Margin of the *Corpus Calloſum* of both Hemiſpheres, which in its natural Site, was placed on the Pineal Gland.

C. The *Fornix*.

DD, Its Arms embracing the *Crura* of the *Medulla Oblongata*.

EE, The *Thalami Nervorum Opticorum*, on the *Crura* of the *Medulla Oblongata*, whence the Optick Nerves proceed; at the tops of which *Crura* (ſituated further out of ſight) are placed the *Corpora Striata*.

F, The *Glandula Pinealis*, between which, and the root of the *Fornix*, is the *Rima ad Infundibulum*.

GG, The Orbicular Protuberances call'd *Nates*.

HH, The leſſer Protuberances, call'd *Teſtes*, which are *Epiphyſes* of the former.

II, The *Proceſſus Medullares*, which aſcend obliquely from the *Teſtes* into the *Cerebellum*, and conſtitute part of its *Meditullium* on both ſides.

K, The joyning of thoſe Proceſſes by another Tranſverſe Proceſs.

LL, The Pathetick Nerves, ariſing from the laſt mention'd Tranſverſe Proceſs.

MM, A Portion of the *Medulla Oblongata*, lying under the aforeſaid Proceſſes and Protuberances.

N, The *Foramen* of the third Ventricle or Cavity; which, is placed under the Orbicular Protuberances.

OO, A Portion of the Annulary Protuberance (call'd *Pons*) ſent from the *Cerebellum*, and embracing the *Medulla Oblongata*.

PP, The external and ſuperior Superficies of the *Cerebellum*.

FIG. II.

The interior *Baſis* of the Skull, where is ſhewn, after what manner the Blood-Veſſels and Nerves, when cut from the Brain and about to go out of the Skull, are cover'd by the *Dura Mater*.

A, The Bone of the Forehead, in which (towards the top of the Noſe) there's a Cavity, but not expreſs'd in this Figure, as *Blancard* pretends.

B, The *Septum* of the *Os Cribriforme*, call'd *Criſta Galli*.

CC, The Mammillary Proceſſes, which are much leſs, and have leſs Cavities in them, than is found in theſe parts in Quadrupeds, which are indued with a more exquiſite Senſe of Smelling.

DD, The Optick Nerves, which in Human Bodies part farther from each other, before they paſs out of the Skull, than in moſt Quadrupeds.

E, The Pituitary Gland, with the top of the *Infundibilum* inſerted into it.

EE, The Carotid Arteries coming in, by the ſides of that Gland.

g, The *Infundibulum*.

hh, The third pair of Nerves, call'd *Oculorum Motorii*, going out of the Skull.

HH, The Pathetick Nerves, hid under the *Dura Mater*, and going out of the Skull with the former, theſe are reckon'd the fourth Pair.

II, The fifth Pair of Nerves, hid under the *Dura Mater*.

KK, The ſixth Pair of Nerves, having a very long Progreſs under the *Dura Mater*, before they paſs out of the Skull, with the third and fourth Pair.

LL, The Seventh or Auditory Pair, entering the *Os Petroſum* with double Proceſſes.

MM, The eighth Pair, call'd *Vagum*, compos'd of many Fibres, which joyn with the Acceſſory Nerve, NN, As they march out of the Skull.

OO, The ninth Pair.

PP, The tenth Pair, tending downwards, and paſſing under the *Dura Mater*, where the Vertebral Arteries aſcend.

QQ, The Lateral *Sinuſes* open'd.

TAB. XIII.

FIG. I. *From Dr.* Willis, *the other from* Bidloo.

FIG. I.

A Sheeps Brain, divided through its middle, and its Hemiſpheres turn'd over; ſome parts of it being ſcrap'd away, to ſhew its Medullary Tracts, or Nervous Roots.

AA, The Medullary Protuberances, call'd *Teſtes*, which are *Epiphyſes* of the *Medulla Oblongata*, and joyn'd to the *Caudex Medullaris* of the *Cerebellum*, looking from thence towards the Brain.

BB, The *Protuberantiæ Natiformes*, the Subſtance of which, in Sheep, Goats, and many other Creatures, is partly Cortical, and partly Medullary; but in a

Man, Dogs, Foxes and others, it is wholly Medullary.

C, The Cavity, or third Ventricle, under the Prominences, which are here diſſected and open'd.

D D, The two Medullary Cords of the *Caudex Medullaris*, paſſing ſtrait to the *Corpora Striata*.

E E, The *Thalami Nervorum Opticorum*.

ee, The *Glandula Pinealis*, divided and laid apart.

FF, The Nervous or Medullary *Ductus*, proceeding from the Prominences, which is preſently divided; one Branch G, paſſing to the *Cone* of the *Corpora Striata*, the other H, going to its *Baſis*.

I, A *Surculus* from the Medullary Branch, paſſing at the *Baſis* of the *Corpus Striatum*, and reaching to the middle of its *Limbus*.

K, The poſterior *Limbus* of the *Corpus Striatum*, receiving Nervous Ducts, which are united under the Roots of the *Fornix*, with the ſame *Limbus* of the other ſide.

L, The *Corpus Striatum* of the left ſide whole, with the Blood-Veſſels creeping on its cortical Surface.

M, The *Corpus Striatum* of the right ſide; the cortical Surface of which is cut off to ſhew its Medullary *Striæ*.

NN, The foremoſt *Limbus* of the *Corpora Striata*, joyning in the *Corpus Calloſum*.

O, The *Baſis* of the *Fornix*.

P, The Trunk of the *Fornix*, cut off and turn'd back with the Brain.

QQ, The two Roots of the *Fornix*.

RR, The internal Surface of the *Corpus Calloſum*, mark'd with tranſverſe medullary *Striæ*.

S, A *Sepimentum* of the Medullary *Striæ*.

TT, The hinder part of the Brain, which reſted on the *Cerebellum*, turn'd up.

VV, The *Cerebellum* divided and laid apart.

W, The *Medulla Oblongata* immediately below the fourth Ventricle.

FIG. II.

The *Plexus Choroides*, view'd by a Microſcope.

AA, The Membranous Covering ſeparated, which incloſes the *Faſciculi* of Veſſels.

B, The Arteries, and

C, The Veins (whoſe Ramifications and *Plexus* are made to appear) being fill'd with *Plaiſter of Paris*, and their own Blood.

D, The Lymphæducts ſomewhat diſtended with Wind.

E, The *Fibrillæ* of the Nerves.

F, The Glands placed between the Nerves, ſome of which are hard and fibrous, others are Veſiculous and more Flaccid.

FIG. III.

The Structure of a Nerve, expreſs'd by the aſſiſtance of a Microſcope.

A, The Branch of a Nerve diſſected from the Neck.

B, The Blood-Veſſels.

C, The *Faſciculi* of Tubes ſeparated.

D, The Tubes cleaving by lateral Fibres.

E, The Villous Extremities of the Tubes.

TAB. XIV.

From Dr. Willis.

FIG. I.

SHews the *Baſis* of a Sheeps Brain, ſome parts being pared away, and others expoſed bare, ſo that the *Striæ*, or Medullary Tracts, appear like ſo many Nerves.

AA, The Mammillary Proceſſes carried to the *Baſis* of the *Corpora Striata*, and inſerted into them.

BB, The parts of the Brain remaining after the greateſt part of it is cut off.

CC, The *Corpora Striata* deraſed, ſo that the *Striæ Medullares* of its internal part appear.

DD, The *Thalami Nervorum Opticorum*, in which the Medullary *Striæ* paſs ſtreight, and very cloſe towards the *Corpora Striata*.

E, A Tract leading to the *Infundibulum*.

F, A Gland placed behind the *Infundibulum*, which is double in Man.

GG, The Trunks of the Optick Nerves, divided at their *joyning* or *Coalition*, before the *Infundibulum*, and turn'd off.

HH, The *Crura* of the *Medulla Oblongata*, under the *Nates* and *Teſtes*, in which the *Striæ Medullares* paſs ſtreight, and very thick and cloſe together towards the *Corpora Striata*.

II, The Tranſverſe Medullary Tracts, diſtinguiſhing the Regions of the *Medulla Oblongata*.

KK, The Annulary Proceſs paſſing about the *Medulla Oblongata*, nigh the *Cerebellum*.

L, The Extremity of the *Medulla Oblongata*, near the beginning of the Spinal Marrow, M.

FIG. II.

The Orbicular Prominences (*i. e.* the *Nates* and *Teſtes*) and *Thalami Nervorum Opticorum*, pared off on one ſide, to ſhew their internal Compages.

AA, The *Teſtes* which have ſtreight Fibres through the whole.

B, One of the *Nates* deraſed, in which the Medullary Fibres paſs ſtreight and thick towards the Brain.

C, A Medullary *Septum*, dividing the Natiform Prominences from the Optick *Thalamus*; from which one Medullary Proceſs paſſes to the *Baſis* of the *Corpus Striatum*, the other into its *Cone*.

D, The *Thalamus* of the Optick Nerve of the left ſide deraſed, to ſhew its ſtreight and very cloſe Fibres paſſing towards the *Corpus Striatum*.

E, The poſterior *Limbus* of the *Corpus Striatum*, receiving the Optick Medullary *Striæ*, and thoſe of other Medullary Proceſſes.

F, The *Corpus Striatum* eraſed, whoſe Nerves and Medullary Ducts are in like manner expreſs'd Tab. XIII. Fig. I. M.

G, The *Anterior Limbus* of the *Corpus Striatum*.

H, A *Sinus* from the Mamillary Proceſs, leading into the anterior Ventricle of the Brain.

I, The Hemiſpheres of the Brain.

The reſt of the Characters are explain'd in the preceeding Figure.

TAB XV.

FIG. I & III *from* Gerard Blaſius, *the reſt from Dr.* Willis.

FIG. I.

PArt of the Spinal Marrow taken out of the *Vertebræ* of a Dog, expreſs'd as big as the Life.

aa, The Nervous Filaments ariſing from the back part of the Spinal Marrow.

bb, Thoſe of the fore-part.

cccc, The *Dura Meninx* divided, according to its length, on the back part of the Spinal Marrow next the Spines of the *Vertebræ*, and laid aſide.

d, The union of the Nervous Filaments a, b, after they have paſs'd the *Dura Meninx*, where they make a *Ganglion* at their *exit* between the *Vertebræ*, and compoſe the Trunk of the Nerve.

e, A large Fiſſure in the back part;

f, A leſs Fiſſure in the fore-part of the Spinal Marrow.

g, The internal Cortical Subſtance, of a Cineritious colour.

FIG. II.

Shews the whole Spinal Marrow taken out of the Bony *Specus* of the *Vertebræ*, together with its inveſting Membrane, which is here divided according to its length, to ſhew the Originals of the Nervous Filaments of all the vertebral Nerves from the *Medulla Spinalis*.

AA, The upper part of the *Medulla Spinalis*, cut from the *Oblongata*.

BB, The *Arteria Spinalis* paſſing the whole length of the Spinal Marrow, which communicates in the Neck with the Cervical Arteries, as expreſs'd Fig. IV. g h *&c.* The lower part of this Spinal Artery having *Anaſtomoſes* with the Vertebral Arteries ariſing from the *Arteria Magna*. vid. Fig. II. of the following Table.

CC, The *Nervus Spinalis* by Dr. *Willis*, call'd *Acceſſorius*, ariſing about the 5th and 6th *Vertebra* of the Neck, and going out of the Skull with the *Par Vagum*.

DD, The *Dura Mater*, or inveſting Membrane of the Spinal Marrow, divided according to its length, and expanded.

E E F f, The Nerves of the Neck.

Gg, The Nerves that paſs to the Arms, and ariſe from that part of the *Medulla Spinalis* that is ſomewhat dilated, and have larger nervous *Faſciculi* at their *Originals*.

H h, The Nerves of the Back, where the Spinal Marrow is leſſened again.

I i, The lower part of the Spinal Marrow, which ſends Nerves to the Loins and Legs, and is intirely Fibrous in Human Bodies, but is Medullary in moſt Quadrupeds, and is there ſomewhat dilated again.

K, The Nerves paſſing out of the *Os Sacrum*.

FIG. III.

Part of the Spinal Marrow of a Dog cut tranverſly.

aa, The leſſer Fiſſure before.

bb, The larger Fiſſure on the hind part.

ccc, The Nervous or Medullary *Striæ*, tending from the Cineritious or Glandulous Subſtance to the Circumference.

ddd, The Glandulous Subſtance plainly diſtinguiſhable from the Nervous or Medullary.

FIG. IV.

The Ramifications of the Vertebral Arteries, both in the upper part of the *Medulla Spinalis*, and back part of the *Medulla Oblongata*.

AA, The back part of the *Medulla Oblongata*.

B, Both the Vertebral Arteries united.

C, The Rhomboid Figure, which repreſents a double Coalition of the Arteries in Brutes.

D, The meeting of the Vertebral and Cervical Arteries on the *Medulla Spinalis*, from whence the Spinal Artery deſcends.

E, The Spinal Artery.

FF, The two Vertebral Arteries ariſing from the Axillary Arteries.

G, The *Medulla Spinalis*.

ff, or, The Arteries that go to the Muſcles of the Neck.

gg, The Branches ſent to the Spinal Marrow, which joyn at both ſides in the Spinal Artery, at each meeting of the *Vertebræ*.

h h, Branches of Arteries which paſs into the Channels of the *Sinuſes*, and make an Arterious *Plexus*.

i i, The Arteries ſent from the *Aorta* into the Spine.

FIG. V.

The Ramifications of the 5th and 6th Pair of Nerves.

A, The Nerve of the ſixth Pair from the Trunk, of which the Doctor ſays, are ſent two ſhoots into two of the Muſcles of the Eye at a a, which are not expreſs'd in this nor his original Figure.

Z, A Branch of the Nerve of the ſixth Pair, reflected for the Root of the Intercoſtal Nerve.

B, The Trunk of the fifth Pair, immediately before it is divided in two large Branches.

bb, Two Shoots reflected from one of the Branches for the Root of the Intercoſtal Nerve.

C, The Diviſion of the upper Branch into leſſer Branches, of which the ſuperior c is the Opthalmick, which enters the Orbit of the Eye, and ſends out four Branches; The firſt (O) is reflected into the Noſtrils; The ſecond (d) paſſing the outſide of the Orbit of the Eye, runs into the Muſcles of the Forehead; The third and fourth (ee) are diſtributed to the *Palpebræ* and internal Glands of the Eye.

D, The ſecond Branch of the ſecond Diviſion alſo enters the Orbit, and paſſes towards the external Angle of the Eye, and is diſtributed to the *Palpebræ* and exterior Glands.

E, The third Branch of the ſecond Diviſion, paſſes by or under the Orbit of the Eye, marching through a hole in the Bone of the upper Jaw, in which paſſage it ſends a Branch (e) by another *Foramen* into the *Muſculus Maſſeter*.

f, A Branch running to the Muſcles of the Noſe.

ggg, Divers Branches deſcending into the upper Lip.

F, The inferior Branch, or fourth of the ſecond Diviſion, which deſcending ſtrait towards the Roof of the Mouth, is divided into two Branches, of which one of them (h) is diſtributed into the Gums; the ſecond (i) is diſſeminated with many Twigs into the Palat.

G, The ſecond Branch of the firſt Diviſion of the *Par Quintum*, which paſſing ſtrait downwards into the lower Jaw, in its way ſends many Branches; as follows,

K, One of its Branches to the Parotid Gland;

l, Another to the internal Maſticatory Muſcles;

m, Another Branch paſſing round the Proceſs of the lower Jaw, is carried to the external part of the *Maſſeter*;

n, Another *Surculus* running oppoſite to the former, on the ſame Proceſs, and diſtributed into the internal part of the ſame Maſticatory Muſcle.

H, A Trunk of a great Branch paſſing further on, is divided into divers Branches; of which that at O tends to the Root of the Tongue; P That which goes to the whole Body of the Tongue with many Branches; q Thoſe that paſs to the parts under the Tongue; r r The Trunk that paſſes through the lower Jaw, and gives ſlips to the Teeth, and to the lower Lip sss; and partly to the Chin tt.

FIG. VI.

All the Nerves of the third, fourth, fifth and ſixth Pairs, that paſs to the Muſcles, and other parts of the Eye.

A, The Nerve of the third Pair, which paſſes to three of the ſtrait Muſcles, and the external oblique Muſcle of the Eye.

B, A Nerve of the fourth Pair, or Pathetick Nerve, paſſing into the *Muſculus Trochlearis.*

C, A Nerve of the ſixth Pair, proper to the *Muſculus Abducens*, and *Septimus Brutorum.*

D, A Nerve of the fifth Pair, whoſe Ophthalmick Branch (E) is divided into two; F The upper Branch is preſently ſplit into ſeveral Twigs, marching ſtrait to the internal Angle of the Eye; G The lower Ophthalmick Branch divided into Branches, and in a like manner paſſes to the Gland and *Palbebræ*, at the external Angle of the Eye.

a, A Nerve of the fifth Pair, paſſing to the *Muſculus Trocklearis:*

b, A Branch of the Third, to the *Attollens:*

c, Another Branch of the ſame, to the *Abducens:*

d, Another of the ſame, to the *Deprimens:*

f, Another to the *Muſculus Obliquus Externus:*

g, Little Nerves from the *Plexus* of the third Pair, paſſing through the Sclerotick Tunick into the *Uvea.*

e, A Nerve of the ſixth Pair; to the *Muſculus Abducens.*

ooo, Fibres or little Branches from the fourth and ſixth Pair; paſſing to the *Muſculus Septimus Brutorum.*

n, A Nerve from the upper Ophthalmick Branch, going into the Noſtrils (i); One from the ſame Branch into the Eyebrows and Forehead.

H, The Trunk of the fifth Pair cut off, which went to the lower Jaw.

I, Another Trunk of the ſame, which went to the Palat; alſo cut off.

K, The Branch of the upper Jaw.

TAB. XVI.

From Dr. Willis, *but very ill copy'd, wherefore the Original Figure is here referr'd to; ſee the Doctor's ninth and eleventh Tables of his Anatomy of the Brain.*

FIG. I.

SHews the beginnings of the fifth and ſixth Pairs of Nerves, and the Roots of the Intercoſtal Nerve proceeding from them; likewiſe the Origines and Branchings of the ſame Intercoſtal Nerve, and the *Par Vagum*, and the Acceſſory Nerve, produced out of the Spine to the *Par Vagum*; and the Ramifications carried to the Stomach: Here alſo are repreſented the Beginnings and Diſtributions of the ſeventh, ninth and tenth Pair of Nerves, and of thoſe of the Diaphragm; alſo the Originations and Inſertions of the Nerves of the *Præcordia* and the *Viſcera*, with the Originations of the vertebral Nerves, and their communications with the former.

AA, The Nerve of the fifth Pair, with its two Branches AA, the upper of which tending ſtrait, diſtributes it ſelf into the Muſcles of the Eye and Face, into the Noſe, Palate, and the upper part of the Mouth; and beſides, it reflects two Branches a a, which make two of the Roots of the Intercoſtal Nerve; the other lower Branch of the fifth Pair tends downwards, and is diſpers'd into the lower Jaw-bone and all its parts.

a a, Two Shoots ſent down from the upper Branch of the fifth Pair, which meeting with the other Branch b, reflected from the Nerve of the ſixth Pair, make up the Trunk of the Intercoſtal Nerve D.

B, The Nerve of the ſixth Pair, tending ſtrait downwards into the Muſcles of the Eye, out of whoſe Trunk the Branch b, which is the third Root of the Intercoſtal Nerve, is reflected.

b, The third Root of the Intercoſtal Nerve.

C, The Origin of the *Auditory Nerve*, or of the ſeventh Pair, with its double Proceſs, *viz.* the ſoft and hard.

c, The ſofter Branch of it, which is wholly diſtributed into the inward part of the Ear, *viz.* into the Muſcles of the *Hammer*, and into the *Cochlea*.

d, The harder Branch of *it*, which ariſing whole without the Skull, and being inoſculated with the Shoot of the eighth Pair e, conſtitutes with it a ſingle Nerve, which preſently is divided into more Branches; of which,

1, Is beſtow'd on the Muſcles of the *Tongue*, and of the *Os Hyoides*.

2, Again into more Shoots the upper of which,

3, Into the Muſcles of the Face and Mouth,

4, Into the Muſcles of the Eye-lids and Forehead,

5, Into the Muſcles of the Ear.

D, The Trunk of the Intercoſtal Nerve, conſiſting of the three aforeſaid Roots, which preſently after forms the *Gangliform Plexus*, which *Plexus* of the Intercoſtal Nerve, juſt without the Skull, ſeems to be the higheſt Knot.

E, The Original of the Nerve of the *Par Vagum*, or eighth Pair, conſiſting of many Fibres, with which the Nerve G, ariſing out of the Spine joyns, and being inoſculated with them, paſſes together through the Skull, after which it returns again, and having made a Communication with ſome neighbouring Nerves, is beſtow'd on the Muſcles of the Shoulders and the Back.

e, A Shoot of the eighth Pair, meeting with the Auditory Nerve.

f f f, Other Branches of the *Par Vagum* going into the Muſcles of the Neck.

G, The principal Branch of the ſame Pair hid in the Ganglioform Proceſs.

H, The upper Ganglioform *Plexus* of the *Par Vagum*, which admits a Branch k, out of another neighbouring *Plexus* of the Intercoſtal Nerve.

h, A Branch out of the aforeſaid *Plexus* of the *Par Vagum* going into the Muſcles of the *Larynx*, a conſiderable Branch of which, going under the Scutiformal Cartilage, meets with the returning Nerve, to which it is joyn'd.

i, A Branch ſent from the cervical *Plexus* of the Intercoſtal Nerve into the Trunk of the *Par Vagum*.

K, The lower *Plexus* of the *Par Vagum*, from which very many Nerves go to the Heart, and the Parts about it.

l, A remarkable Branch ſent into the Cardiack *Plexus*.

m, Nervous Fibres diſtributed into the *Pericardium*, and Veſſels joyning to the Heart.

n, The left recurrent Nerve, which, being reflected upwards towards the Scutiform Cartilage, near which it compaſſes about the Trunk of the *Aorta*, in its aſcent ſends many Branches † † † † to the *Aſpera Arteria*, and then meets with a Shoot h, ſent from the Ganglioform *Plexus*. This returning from that *Plexus*, ſends ſome Shoots towards the Heart.

L, The right recurrent Nerve, which being reflected much higher, binds about the Axillary Artery.

O, A notable Branch ſent down from the Trunk of the *Par Vagum* of the left ſide to the Heart, and preſently dividing, one Branch paſſes about the Trunk of the Pneumonick Vein, the other gently touching the back part of the Heart, is diſpers'd into more Branches which lye over its Superficies; from this Pair is ſent a Cardiack Branch from the Trunk of the other ſide.

p, A Branch of the aforeſaid Shoot going about the Pneumonick Vein.

q, Another Branch of the ſame, ſending many Shoots to the Heart, which lye over its hinder Superficies.

r r r, Small Branches ſent out from the Trunk of the *Par Vagum*, which are joyn'd in a long Tract with the *Oeſophagus*, being turn'd back from their proper place.

SSS, Many Branches cut off, whoſe Shoots being diſtributed into the Subſtance of the Lungs, variouſly ſtraiten and bind about the Sanguinary Veſſels.

TTT, The Trunk of the *Par Vagum* is divided into two Branches, *viz.* outward and inward, both of which inclining towards the like Branches of the other ſide, are joyn'd to them, and after a mutual Communication, make up the two Stomachick Branches, *viz.* the upper and lower.

VV, The internal Branches

which being united in X, conſtitute the beginning of the inferior Stomachick Branch.

WW, The outward Branches, which being united in the Figure to be added to this, make the other Stomachick Branch.

X, The joyning of the inward Branches.

F, The beginning of the Nerve of the ninth Pair, with many Fibres,which being united make a Trunk which is carried towards the Tongue, and in its Progreſs ſends down two Branches.

ΘΘ, The firſt Branch tending downwards, which being united to a Branch of the tenth Pair, is beſtow'd on the Sternothyroeidal Muſcle.

⊙ ⊙, The ſecond Branch is ſent into the Muſcles of the *Os Hyoides*.

⊖-, The Trunk of this Nerve paſſing into the Body of the Tongue.

G, The upper Ganglioform *Plexus* of the Intercoſtal Nerve, which is the laſt Knot of this Nerve coming out of the Skull.

α, A Branch out of this *Plexus* ſent into the neighbouring *Plexus* of the *Par Vagum*.

bb, Two nervous Proceſſes, by which this *Plexus* communicates with the Nerve of the tenth Pair.

c, A Shoot ſent down into the *Sphincter Gulæ*.

d, The middle or *Cervical Plexus*, which being proper to a Man, lies nigh the middle of the Neck, in the Trunk of the *Intercoſtal* Nerve.

e, A noted Branch out of the ſecond vertebral Pair, going into this *Plexus*, whereby this communicates with the Nerve of the *Diaphragm* in its firſt Root.

ff, Two Branches going from the ſame *Plexus* into the Trunk of the Nerve of the *Diaphragm*.

gg, Many nervous Fibres going out of the *cervical Plexus* into the current Nerve, and to the ſanguinary Veſſels to the Trunk of the *Trachea* and *Oeſophagus*.

h, A Branch from the ſame into the Trunk of the *Par Vagum*.

ct, Another noted Branch going into the returning Nerve.

ii, Two remarkable Shoots ſent towards the Heart, which another Branch λ ariſing a little lower follow, theſe being carried downwards between the *Aorta* and the Pneumonick Artery, and meeting with the like Branches of the other ſide, conſtitute the *Cardiack Plexus* Δ from which the chief Nerves proceed that are beſtowed on the Heart.

λ, A Branch proceeding a little lower from the Intercoſtal Trunk, which goes with the former to the Cardiack *Plexus*.

Δ, The aforeſaid Cardiack *Plexus*.

μ, A Link going from the ſame, which compaſſes about the Pneumonick Artery.

ν, The lower Link incloſing the Pneumonick Vein.

Ξ, The Intercoſtal Nerve demers'd into the Cavity of the

Thorax, where it binds the axillary Artery.

ξξξξ, The four vertebral Nerves ſent down into the *Plexus* of the *Thorax*, the upper of which binds the vertebral Artery.

ooo, Three noted Branches ſent down from the ſame *Plexus*, which lie over the fore-part of the Heart, as the Nerves p, q, coming from the Trunk of the *Par Vagum*, give Branches to its back part.

π, The vertebral Artery bonnd about by the aforeſaid Nerve.

ςςς, Nervous Shoots covering the fore-part of the Heart.

τττ, Branches and nervous Fibres ſent into its back part.

Θ, The inferior *Plexus* properly call'd the Intercoſtal or Thoracick, into which four Vertebrals, beſide the Intercoſtal Nerve are inſerted, the uppermoſt of theſe in its deſcent paſſes about the vertebral Artery.

I, The Intercoſtal Nerve deſcending through the Cavity of the *Thorax* juſt by the Roots of the ſides, where in its whole progreſs it admits a Branch from between each *Interrodium* of the *Vertebræ*.

H, The Nerve of the tenth Pair, conſiſting of many Fibres in its beginning, and paſſing out between the firſt and ſecond *Vertebra*, where it preſently ſends forth two nervous Proceſſes b, into the ſuperior *Plexus* of the Intercoſtal Nerve.

*, Its Branch, which being united to the Shoot of the ninth Pair, is beſtow'd into the Sternothyroeidal Muſcle, immediately lying upon the *Aſpera Arteria*.

□, The Branch ſent into the poſterior Muſcles of the Neck.

△, A Branch ſent into the pathetick Spinal Nerve.

*** Shoots from the chief Branch of the ſame Nerve, ſent into the Sternothyroeidal Muſcle.

L, The Origin of the firſt vertebral Nerve, which in this, as well as in all other Vertebrals, conſiſts of many Fibres, one band of which going out of the lower Margin of the Spinal Marrow, and the other from the upper meeting one another, grow together into one Trunk, which preſently is divided into divers Nerves diſtributed many ways.

ρ, A Shoot from this Nerve into the Branch of the tenth Pair.

σ, Another Shoot into the Spinal Pathetick Nerve.

s, A noted Shoot ſent forth upwards into the Muſcles of the Neck.

T, A Shoot from the crooked Nerve into the anterior Muſcles of the Neck.

Z, A Nerve from this pair into the firſt brachial Nerve, out of which the Nerve of the Diaphragm hath its higheſt root.

M, The Origin of the ſecond vertebral Nerve, whence the higheſt brachial Branch (V) proceeds, and in which the

Nerve of the Diaphragm is firſt rooted. This brachial Nerve in Quadrupeds ariſes nigh to the 4th or 5th *Vertebræ*, and therefore the *Radix* of the Diaphragm is placed lower.

V, The vertebral Branch going to the Arm.

ϒ, The Nerve of the Diaphragm, a Branch of which ẟ goes from the Cervical *Plexus* to its root, and a little below two other Branches εε paſs into its Trunk from the ſame *Plexus*; this Communication is peculiar to Humane Bodies.

φ, The other Root of the Diaphragm from the ſecond and third brachial Nerve.

χ, The lower Trunk of the Nerve of the Diaphragm removed, which in its proper place paſſing through the Cavity of the *Thorax* without any Communication, goes ſtrait to the Diaphragm, where being ſtretch'd out into three Branches, it is inſerted in its muſculous part.

♆♆♆♆, The other brachial Nerves, out of whoſe Roots Branches go into the intercoſtal *Plexus*.

ω, ω, ω, ω, The Origins of the vertebral Nerves from the ſeveral Roots of which, a Branch is carried into the intercoſtal Nerve.

♃, ♃, The laſt Origin of the Spinal acceſſory Nerve, that goes to the *Par Vagum*, beginning with a ſharp point.

♀, The aſcending Trunk of the ſame Nerve, which in its whole aſcent paſſing by the ſide of the Spinal Marrow, paſſes through the midſt of the Origins of the vertebral Nerves, and receives Fibres at the Trunk of the Marrow.

δ, The deſcending Trunk of the ſame Nerve, which going from the *Par Vagum*, is reflected outwards, and after it hath had communication with the Nerves of the ninth and tenth Pair, is beſtow'd wholly upon the Muſcles of the Shoulders.

☽, The lower Proceſs of the ſame Nerve.

The following Characters are repeated on the lower part of this Figure, which makes the 11th Table of Dr. *Willis*, and ſhew the interior Ramifications of the Nerves of the *Par Vagum*, and of the Intercoſtals, diſtributed to the Ventricle and the *Viſcera* of the whole *Abdomen*. Likewiſe the Origins of the vertebral Nerves are deſcrib'd, which ſtand over-right the former, and are inoſculated with ſome of them. The Figure in theſe, and in four-footed Animals, are almoſt alike, ſo that this Figure may be common to both.

A, The lower Stomachical Branch, which is made up of the internal Branches of both ſides of the *Par Vagum*, being united together, and covering the bottom of the Ventricle; diſperſes Branches on every ſide in the whole Tract.

B, The upper Stomachical Branch, which is made of the external Branches of both ſides of the *Par Vagum*, being united together, creeps through the top of the Ventricle.

C, The Coalition or joyning together of the external Branches.

D, The *Plexus Nervoſus* of the Fibres of both the Stomachical Nerves, united together nigh the Orifice, and as it were woven into a Net.

a a, The Extremities of both the Stomachical Nerves, which there meet with the Nerves of the Liver and communicate with them.

EE, The intercoſtal Nerve deſcending on either ſide nigh the Roots of the Ribs, and in its whole deſcent receiving a Branch from the ſeveral vertebral Nerves ε ε.

F, A Branch going out of the Intercoſtal Nerve of the left ſide, and ſent down towards the Meſenterick *Plexus*.

G, The ſame Meſenterick Nerve divided into two, ſends the greater Branch into the *Plexus*, which is the Stomachical, and the Splenetick, and the leſſer into the *Plexus Renalis*.

H, The like Meſenterick Branch coming from the intercoſtal Nerve of the right ſide, and bending towards the Meſenterick *Plexus*.

J, This Nerve being divided, parts with its great Branch to the Hepatick *Plexus*, and the leſſer into the *Plexus Renalis*.

♄, The chief Meſenterick *Plexus* of the left ſide, which is the Stomachical and Lienary; from which many little companies of Nerves, or numerous Conjugations, are ſent out many ways.

♃, The renal Meſenterick *Plexus* of the left ſide, into which, beſides the Meſenterick Branch

β β, Two other Nerves are immediately carried out of the intercoſtal Nerve.

γ γ γ, From this *Plexus* placed nigh the Gall-Bladder, more Nerves and Fibres are ſent into the Kidney.

δ δ, Nerves and Fibres, by which this *Plexus* communicates with the greateſt *Plexus* of the Meſentery.

ζ, The chief bundle of Nerves tending out of the former *Plexus* (♄) into the Spleen, which it having reach'd, reflects from thence into the bottom of the Ventricle.

η, The ſecond Conjugation of the Nerves from the aforeſaid *Plexus* into the bottom of the Ventricle, whoſe Fibres communicate with the Fibres and Branches of the lower Stomachical Nerve.

θ, The third Conjugation of Nerves between this *Plexus* and the neighbouring Hepatick ♂.

ι, The fourth Conjugation of Nerves between this and the greateſt *Plexus* of the Meſenterick Θ.

♀, The Renal Meſenterick *Plexus* of the right ſide, into which (as in its fellow) beſide the Meſenterick Branch.

κ κ, Two Nerves produced from the intercoſtal Nerve.

λ, The Nerves and Fibres

between this *Plexus* and the greateſt of the Meſenterick.

μ, A noted Branch between this *Plexus* and the neighbouring Hepatick ν.

ν, A noted company of Nerves and Fibres from this *Plexus* into the Kidney, which climbing up the emulgent Veſſels variouſly paſs about them.

♁, The ſuperior Meſenterick *Plexus* of the right ſide, which alſo is the Hepatick.

ο, A great Conjugation of Nerves out of this *Plexus* into the Liver and Gall-Bladder, out of which likewiſe many Branches are ſent into the *Pylorus* and *Pancreas*. The Nerves and Fibres of this in its aſcent towards the Liver, cover the Hepatick Artery as it were, by making a Net, and almoſt hide its Trunk; the Branches of theſe meet with the tops of the Stomachical Nerves a a.

ππ, Shoots diſtributed about the *Pylorus*.

ρρ, Other Shoots diſpers'd into the *Pancreas*.

ςς, Nerves reaching out between this *Plexus* and the greateſt of the Meſentery. This *Plexus* communicates with the neighbouring Renal by (μ) and with the Stomachical by (θ). The greateſt Meſenterick *Plexus*, out of which a great bundle of Nerves . . . . . ariſing under the great *Glandula* of the Meſenterick, from thence is diſpers'd every where about into very many Branches and Shoots, and are diſtributed into all the Inteſtines (except the *Rectum.*) Theſe Nerves and Fibres reaching out on every ſide, accompany the Meſenterick Arteries and Veins, and variouſly paſs about them in their whole progreſs.

ττ, Nervous Branches from this *Plexus* into the Womens Teſticles or uterine *Glandulæ*, which meet with the Branches of the vertebral Nerves of the 20th and 21ſt Pair, ſent into the ſame parts, and are inoſculated with them.

υυ, The vertebral Nerves which go into the Womens Teſticles.

☽, The loweſt *Plexus* of the Meſentery placed far below the former, and having for its origin three Nerves ariſing lower from the Intercoſtals.

φφφ, Three Nerves ſent down on either ſide from the Intercoſtal Nerve into the loweſt *Plexus* of the Meſenterick.

χχ, A Nerve ſtretch'd out from that *Plexus*, directly into the greateſt *Plexus* of the Meſentery, which in its paſſage receives on both ſides ſome Branches from the intercoſtal Nerve, *viz.* 44. 5. 5. 5. and it ſelf ſend two Branches into the Womens Teſticles.

ψψ, Two Branches from the aforeſaid Nerve into the Womens Teſticles.

☿, Another ſmall *Plexus* ſtanding a little above this loweſt.

ω, A nervous Proceſs from the aforeſaid loweſt *Plexus* ſtretch'd out into a ſmall neighbouring *Plexus*.

a, From the leaſt *Plexus* ☿ a noted Nerve being carried into the greateſt *Plexus* of the Meſentery, which in its whole aſcent goes under the *Rectum* and part of the *Colon*, and inſerts many Branches in the ſame.

b, Another Branch ſent downwards from the ſame *Plexus*, which goes under the lower part of the ſame ſtreight inteſtine, and beſtows upon it many Shoots.

c c, Two Nerves ſent downward from the loweſt *Plexus* of the Meſentery ☽, which being ſent down into the *Pelvis* of the *Abdomen*, go under the two *Plexus*'s there K. K. *viz.* one placed on either ſide.

KK, A double *Plexus* placed within the *Pelvis*, whoſe Nerves are employ'd in the ſeveral Excretions there made (*viz.*) the Urine, Excrement, and Seed; theſe ſend out Nerves d d towards the loweſt Meſenterick *Plexus*.

d d, A Nerve aſcending from the aforeſaid *Plexus* on either ſide nigh the ſide of the *Rectum*, and ſends Shoots into it, which double *Plexus* meets with another Nerve b deſcending from the leaſt *Plexus*.

e e, Two Nerves from the ſame *Plexus* into the Womb.

f, A Nerve from the ſame *Plexus* into the Bladder.

g, A Nerve into the *Proſtatæ*.

h, A Nerve out of the Root of the 28th vertebral Pair, into the Muſcle of the *Anus*.

i, The 29th vertebral Pair, from which

k, A Nerve into the Sphincter, and the other Muſcles of the *Anus*.

l, A noted Nerve on both ſides from that Pair into the *Penis*.

m, Another ſhorter Branch into the Muſcles of the *Penis*.

LL, The intercoſtal Nerve below the Kidneys.

m, A little Nerve from the vertebral Branch, which paſſes into the *Cremaſter* Muſcle of a Man's Teſticles.

n, The 21ſt vertebral Pair, whoſe origin being placed behind the Kidnies lies hid; from this Nerve more Shoots are ſent out on both ſides into the Teſticles of the Female Sex, which meet with other meſenterick Shoots diſtributed to the ſame part.

o, A Nerve out of the 22d vertebral Pair, from which alſo ſome Branches are ſent into the Womens Teſticles.

p p p, &c. Nerves which paſs to the Thighs, of which thoſe that riſe higher receive in their deſcent Branches from the Nerves ariſing lower.

q, The intercoſtal Nerves mutually bending one to another near the beginning of the *Os Sacrum*, communicates by the croſs Proceſs.

r, Another croſs Proceſs within the bending of the *Os Sacrum*, joyning the two intercoſtal Nerves.

S, Both the intercoſtal Nerves end in ſmall Fibres, which

Fibres are diſtributed into the very Sphincter of the *Anus.*

t, A Nerve from the 24th vertebral Pair, which is carried into the inguinal Glandules.

VVV, Shoots ſent down from the intercoſtal Nerve on both ſides into the Body of the Ureters.

X, A Nerve which goes to the Teſticles and the *cremaſter* Muſcle cut off where it goes out of the *Abdomen.*

FIG. II.

The Spinal Artery that lyes on the fore-part of the *Medulla Oblongata* within the Bony *Specus* of the *Vertebræ* ruuning along from the *Occiput* to the *Os Sacrum* like Net-work.

a a a, Arterial Shoots from the vertebral Artery aſcending between the holes of the Spinal Proceſſes, ſent down towards the Spine.

b b b, Arterial Branches ſent down from the *Aorta* towards the Spine.

c c c, &c. An arterial Shoot reaching out of every aforeſaid Branch into the Spinal Marrow.

d d d, &c. Other Shoots from each of the aforeſaid Branches, paſſing to the fore-part of the Spinal Marrow.

e e e, The aforeſaid Arterial Branches, which as ſoon as they are carried to the bony Den, preſently become forked, and ſend forth little Branches into either part, which on both ſides communicate with the next Branch of the ſame ſide, and by the croſs Proceſs with the fellow Branch of the other ſide.

f f f, The joyning together of the Arteries of either ſide by the croſs Branch.

g g, Arterial Branches going out of the *Os Sacrum.*

h h, Arterial Branches going to the *Meninges* of the hinder part of the Head.

i i, Arterial Branches going out of the Skull with the Nerves of the ſeventh Pair.

k k, Shoots reaching out into the wonderful Net, which in their Progreſs are inoſculated mutually among themſelves, and at length with the Carotid Arteries.

FIG. III.

Part of the Pulmonick Nerve view'd with a Microſcope, to ſhew its Branchings on the Lobules of the Lungs.

A, The chief Trunk.

b b, The *Fibrillæ* cut off and diſplay'd, which paſs to the little Lobes of the Lungs.

c c c, The ſmall Stemms of Nerves continued from each *Faſciculus* of nervous Fibres, from whence others are propagated to the next little Lobe.

TAB. XVII.

The 5th, 6th and 8th from Caſſerius, *the reſt from* Bidloo.

FIG. I.

THE External parts of the Eye.

A, The Eye-brow B the upper Eye-lid, C the lower, D the internal Angle of the Eye, in which, part of the *Glandula Lacbrymalis* is ſeen. E, The external Angle, F the Hairs of the upper, and G the lower Eye-lid.

FIG. II.

A, The Skin with the *Muſculus* or *Arbicularis Palpebrarum* remov'd.

B, The Bone of the upper part of the Orbit bored.

C, The great Lachrymal Gland, *in ſitu.*

D, A faint appearance of the excretory Ducts of the Lachrymal Gland. See the following Figure.

E, Divers little Glands interſpers'd with the Ducts.

FIG. III.

The Lachrymal Glands within the Orbit of the Eye repreſented ſomewhat bigger than the Life.

AA, The upper part of the Bones of the Orbit.

BC,&c. The ſuperior Lachrymal Gland.

DD, Its excretory Ducts firſt obſerv'd by *Meibomius*, and call'd *Hygrophthalmicos*, by *Borrichius* and by *Segerus Hygro Clepharicos*, becauſe they diſcharge themſelves of their Lympid Humour within the Orbit and *Palpebræ.*

EE, Divers little Glands diſpers'd between the laſt mention'd Ducts.

FG, The Cartilaginous Rim of the Eye-lids connected with Membranes.

HHH, The Hairs of the upper Eye-lid turn'd ſomewhat upwards, which by the Microſcope appear to have lateral Fibres.

I, The Lachrymal Gland placed in the internal Angle of the Eye.

KK, The little Bones of the Noſe broke off to ſhew the following Ducts

M, L, which convey the ſuperfluous Moiſture of the Lachrymal Ducts into the Noſtril of the ſame ſide.

FIG. IV.

The Muſcles of the Eyes, &c.

A, The *Muſculus Rectus oculum attollens.*

aaa, The Motary Nerves of the Eye.

B, The *Deprimens.*

C, The *Adducens.*

D, The *Obliquus inferior.*

E, The *Abducens.*

F, The *Obliquus ſuperior.*

G, The *Cartilaginous Trochlea.*

HHH, The Tendinous Expanſions of the Muſcles of the Eye.

I, The Optick Nerve implanted into the back part of the Eye.

FIG. V.

The Eye taken out of the Orbit with the Fat about it.

AA, Fat growing to the back part of the Eye.

B, The Muſcles not ſeparated.

CC, That part of the Eye to which the Tendons of the Muſcles do not reach.

FIG. VI.

The Eye-lids with their Muſcles.

AA, The Muſcle of the *Palpebræ* call'd *Levator.*

B, Its thin Tendinous Expanſion at its Termination.

CC, The *Tarſi*, or Cartilages of the Eye-lids.

D, The Lachrymal Caruncle in the internal Angle of the Eye.

d d, The *Puncta Lachrymalia.*

E, The outward corner of the Eye.

FIG. VII.

The external Tunicks of the Eye.

A, The *Tunica Adnata.*

B, The *Cornea.*

C, Its fore-part which is tranſparent, and properly call'd *Cornea.*

D, Its back part properly call'd *Sclerotis*, which is thick and not tranſparent: Externally it is cover'd with the *Adnata*, and internally with the *Uvea.*

E, The Optick Nerve.

FIG. VIII.

The *Tunica Uvea* and *Retina* with the *Cornea* hanging down.

A, The Optick Nerve cover'd with the *Pia Mater.*

B, The *Sclerotis* turn'd off from the *Uvea* and hanging to it.

C, The inſide of the *Sclerotis.*

D, The *Tunica Uvea* partly ſeparated from the *Retina.*

E, The *Retina.*

FIG. IX.

AA, The *Ligamentum Ciliare.*

BB, Its Fibres that paſs according to its breadth,

CC, Its Fibres that paſs but half way: in which are inſerted divers Lymphæducts: This Muſculous Conſtructure with the *Uvea*, is movable and ſtraitens or widens the Dimenſions of the *Pupilla* according to the different degrees of light.

FIG. X.

The Membranes of the Eye without the Humours.

AA, The three Tunicks of the Eye together.

B, Part of the *Pupilla.*

C, The Optick Nerve.

FIG. XI & XII.

The Vitreous and Chryſtallin Humours taken out together.

A, Chry-

A, The Chryſtallin Humour.

B, Parts of the Fibres of the Ciliar Ligament broken off and remaining on

C, The Vitreous Humour.

FIG. XIII.

A, The Chryſtallin Humour taken out.

B, A Membrane rais'd from the Chryſtallin Humour.

FIG. XIV.

AC, The *Vitreus Humour.*

B, A Cavity in this Humour, in which the back part of the Chryſtallin is receiv'd.

TAB. XVIII.

FIG. I, II, III, IV & V. *from* A. Lewenhoek, *the* VIth *from* Henr. Meibomius. *The Five firſt ſhews the Chryſtallin Humour of the Eye variouſly view'd with a Microſcope. See the* Philoſophical Tranſactions *Numb.* 165. *in the Year* 1684, *for the Month of* November.

FIG. I.

ABC THE Chryſtallin Humour of its natural ſize.

B, That part of it next the *Junica Cornea.*

FIG. II.

The Threads conſtituting the Scales wonderfully diſpoſed. From the *Center* L, the Threads paſs three ſeveral ways, not that all the Threads paſs to the *Center*, for example, the ſhorteſt MK. HN. OF. don't come ſo far, but reach to the *Axis* of the other ſide as the Threads ELK do here. They return from thence back, and are in this Section the ſhorteſt Threads HN. Theſe Threads HN are placed on the other ſide near the *Axis*, and returning back again, are then OF; and OF coming from the other ſide nigh the *Axis*, is here again KM. To conclude, thoſe which are here the ſhorteſt Threads, are on the other ſide the longeſt, and *Vice verſa.* To preſent this clear to view, I have drawn with Lines the *Threads* compaſſing one of the Scales of the Chryſtallin Body ſeen on one ſide. See

FIG. III.

RTPSWQ. Tho' it ought to be a flattiſh round, I have here made it Globular, conſidering, that in this Repreſentation the Thread conſtituting each Scale may be the better diſcerned, P and Q are the middle

Points or *Axis*, of which P (in the foregoing Figure 2, denoted by L) the Threads iſſuing out of the Point P, in the foregoing Fig. 2. L, extended to V, where they are the ſhorteſt Threads; from whence they extend back again to P, where again they are the largeſt; and from P they again extend to W where they are again the ſhorteſt: And thus alſo are extended the Threads from T to Q, and thence again to X, and from X to Q, and thus half the Courſe of every one of the Threads is demonſtrated, ſince we muſt ſuppoſe this for an half round. In ſhort the Threads L I in Fig. 2. are here P S, and the Threads between L and M of that Figure, are here the Threads between P and X, and the Threads between L O in the foregoing Fig. 2. are here the Threads between P and T. So that the Threads in the foregoing Fig. 2. between FOLIKE are here in Fig. 3. the ſame with RTPS. Here is further to be obſerv'd, that the Threads conſtituting the Chryſtallin Body, are thickeſt about R and S, and the nearer they approach to P or Q, they are the thinner. To conclude, when we view the foreſaid Chryſtallin Body with attention, as it cometh freſh out of the Eye, we find it to excel in tranſparency the pureſt Glaſs, notwithſtanding it is compos'd of ſo many thouſand Threads, where they lye ſo very cloſe together, that one would wonder how the light can paſs through them in right Lines, which is abſolutely neceſſary; for if it were otherwiſe, the Chryſtallin Body would appear white but not tranſparent.

FIG. IV & V.

The ſame Agreement (ſays *Lewenhoeck*) I found alſo in the Eyes of Hares and Rabbets, except that whereas the Threads conſtituting the beforemention'd Chryſtallin Bodies, ſpread themſelves from the *Center* in three diſtant Courſes; here the Threads of each Scale ſpread themſelves, but in two courſes. Fig. 4. ABCD repreſenteth half the round of the Chryſtallin Body of the Eye of a Hare or Rabbet, E is the *Center*, which lyeth extended to the Apple of the Eye; theſe Threads conſtituting each Scale, which run as through the *Center* E, are on the other ſide the ſhorteſt, and appear like unto F or G; likewiſe F and G, on the other ſide run through the *Center*. I have alſo cauſed the foregoing Figure to be drawn ſidewiſe, the better to repreſent the thread-like appearance of each Scale. I ſuppoſe then that the Threads, which in Fig. 4. are repreſented between E and F, are the ſame with thoſe in Fig. 5. repreſented by I O. So that the Threads which come from the Point I (the ſame with E in the former Figure) end here in N and L, where they are the ſhorteſt; and thoſe which extend to O, through or cloſe to the *Center* M, where they are the longeſt, end there, or bend again on the other ſide, as the ſame do here. In ſhort, thoſe which here approach the *Center* I, are on the other ſide fartheſt from the *Center*.

FIG. VI.

The Lachrymal Duct paſſing towards the Noſtril.

a a, The Continuation of the Lachrymal Duct from the *Puncta Lachrymalia* to the extremity of the Noſtril,

b b, The Excretory Duct that is proper to the Noſtrils.

TAB. XIX.

From M. Du Verney.

FIG. I.

THE Ear in its natural Situation, together with the Arteries which are diſtributed to its fore-part.

ABCD, The Ear ABC its three *Plicæ*, D the *Auricula*, E the *Concha*, at

F, near E is to be ſeen the *Foramen* of the *Meatus Auditorius*, F, The place of the *Tympanum*, or rather *Membrana Tympani*, the two prick'd Lines ſhew the length of the *Meatus*.

GG, Part of the *Os Squammoſum* bored.

H, The *Muſculus Attollens Auriculam* (or firſt Muſcle) lying on the *Os Squammoſum* after the Temporal Muſcle is taken away.

I, Part of the *Os Jugale*.

K, The *Proceſſus Styloides*.

L, The external Carotid Artery cut off about the Angle of the lower Jaw-bone.

M, The Branch which aſcends by the fore-part of the Ear.

N, Thoſe that paſs on the back part of the Ear.

P, A Branch that goes to the Ear it ſelf.

O, Another Branch which paſſes to its Cartilage, and internal part of its *Concha*.

FIG. II.

The Ear drawn forward to ſhew its ſecond Muſcle, with the ſeveral Teguments of the Ear, and the Arteries which lye behind it.

A, The Ear turn'd forward.

B, Its ſecond Muſcle call'd *Retrahens Auriculam*, whoſe Fibres are here bared from their Membranes to ſhew their Progreſs.

C, The Cartilage laid bare, to ſhew the Inſertion of the Muſcle.

D, The true Skin of the Ear, under which the Fat is placed.

E, The *Membrana Nervoſa*, according to *Du Verney*.

F, Part of the *Os Squammoſum*.

G, The Mammillary Proceſs.

H, The Trunk of the Carotid Artery.

I K, Its Trunk, which as it aſcends behind the Ear, ſends divers Shoots to it.

L, A Branch that is beſtow'd on the Cavities of the Maſtoid Proceſs.

M, A Branch after paſſing on the Cartilage is diſpers'd on the *Concha*.

FIG. III.

The Cartilage of the Ear and its *Meatus* laid bare.

A, The Cartilage of the Ear with its Foldings.

B, The Cartilaginous *Meatus* hanging a little down.

C, Part of the Cartilage, which makes the Orifice of the *Meatus*, and which hangs down at the Mouth of the *Concha* in the Figure of the Tongue.

DEF, Three places which are only Membranous where the Cartilages are diſcontinued.

FIG. IV.

Shews the back-part of the Ear, and the upper part of the Cartilaginous *Meatus*, with the Ligaments which joyn the *Concha* to the *Os Temporum*.

AA, The back-part of the Ear.

B B, The back-part of the *Concha* bared.

CC, The Appendices of the Cartilaginous *Meatus*.

D, The upper part of the *Meatus* compos'd only of the Glandulous Skin.

E, A Ligament of the Ear.

FIG. V.

The Glandulous Tunick that inveſts the Cartilaginous *Meatus* repreſented three times bigger than its natural ſize, that all its parts may appear more diſtinct.

A, The external part of the Glandulous Tunick.

B, The *Canalis* or *Meatus* open'd, where the ſmall Hairs may be ſeen with the Mouths of the Excretory Ducts of the Glands.

FIG. VI.

Part of the *Meatus* cut ſo as to ſhew the thickneſs of it, and the manner of the Adheſion of the Glands to that Skin; Some of which Glands are taken out, to ſhew their *Loculi* more diſtinctly.

FIG. VII.

The Temple Bone bared.

A, The Squammous part of this Bone.

BB, Part of the *Os Jugale* or *Apophyſis Zygomatica*.

C, A ſmall Depreſſure where the Ligament of the Ear is faſten'd.

D, The Mouth of the bony *Meatus* of the Ear.

E, The Cliffs that are ſeen in the fore-part of this Bone next the *Fauces*.

F, The Membrane of the *Tympanum* in its proper Situation.

G, The Mammillary Proceſs.
H, The Slytoide Proceſs.
I, The *Canalis* in which the internal *Carotid* paſſes.
K, A *Sinus* between the bony *Meatus* and Squammous part of the *Os Temporum*, by which the Muſcle of the *Malleus* paſſes into the *Tympanum* it ſelf.
L, The Extremity of the bony *Meatus*, which is part of the Channel leading from the Ear to the Palat.

FIG. VIII.

The Bony *Meatus* ſeparated from the Temple Bone.

TAB. XX.

From M. Du Verney.

FIG. I.

THE Temple Bone after its Squammous part with the external *Meatus* is cut away to ſhew the Membrane of the *Tympanum*.

A, The Membrane of the *Tympanum* in its proper place, ſo that it may be readily ſeen.
B, The handle of the *Hammer* cleaving to the inſide of this Membrane.
C, The longeſt Proceſs of the *Incus*, which may be ſeen through the Membrane of the *Tympanum*, tho' it is placed at ſome diſtance behind it.
D, The head of the *Hammer* or *Malleus*.
E, The thick part of the *Incus* with
F, Its ſhort Proceſs, which appears bared in this Section.
G, The Bony *Meatus* broke off in its middle.
H, The Maſtoide *Apophyſis*.
I, The Styloid.
K, The external Muſcle of the *Malleus* in its place.
L......The ſmall ſlender and long Proceſs of the *Malleus*, to which the Muſcle is inſerted.

FIG. II.

The *Membrana Tympani* taken out and view'd laterally.

FIG. III.

The Membrane of the *Tympanum* view'd after the ſame manner, but ſtill remaining in the Extremity of the Bony paſſage.

AA, The ſide of the Bony *Meatus* next the Face, by which the gradual aſcending Progreſs of that paſſage may be underſtood as it leads to the *Membrana Tympani*.

FIG. IV.

The lateral View of the *Incus* and *Stapes* in their proper Situation.

A, The thickeſt part of the *Incus*.

B, The ſhort Branch of the *Incus*, which in this view appears on

C, The long Branch.

D, The head of the *Stapes*, which is joyn'd with the long Proceſs of the *Incus* by the mediation of the fourth Bone.

FIG. V.

N. B. That theſe following Figures, by miſtake of the Graver, are placed in different parts of this Table, and are done four times bigger than the Life.

A, The Beak of the longeſt Branch of the *Incus*.

B, The *Oſſiculum quartum*.

C, The head of the *Stapes*, in whoſe Cavity (here expreſs'd) the *Oſſiculum quartum* is receiv'd.

FIG. VI.

The *Stapes* four times bigger than the Life.

A, Its Head.

B, Its Neck.

CC, Its Sides.

D, Its *Baſis*.

E, The Membrane of the *Stapes*.

FIG. VII.

D, The *Baſis* of the *Stapes*.

FIG. VIII.

A, The *Stapes*.

B, Its Muſcle, both being repreſented more than twice as big as the Life.

FIG. IX.

Shews the ſmall Bones of the Ear, as they appear if you view them from that *Meatus* which opens into the *Maſtoid* Proceſs.

A, The thickeſt part of the *Incus*.

B, Its ſhort Proceſs *foreſhorten'd*, the Eye being directly againſt its Point.

C, Its longeſt Branch.

D, The back part of the handle of the *Malleus*.

E, The *Stapes* ſeen from above.

FIG. X.

Another view of the Bones of the Ear (on the oppoſite ſide) from the *Meatus*, which leads from the Palat to the *Tympanum*.

A, The head of the *Malleus* covering the thicker part of the *Incus*, and its ſhort Proceſs.

B, The handle of the *Malleus*.

C, The longer Branch of the *Incus*.

D, The *Stapes* view'd laterally.

N. B. That the Line or rather *Stylus*, expreſs'd in theſe two laſt Figures, ſhews the parts of theſe Bones that appear above or underneath in their different Views.

FIG. XI.

Repreſents almoſt the ſame parts that are expreſs'd in Fig. 1. of this Table, all being drawn much bigger than in the *Sceleton*. The Membrane of the *Tympanum* being here taken away to ſhew the Bones in their proper Situation, and the parts that appear in the inſide of the *Tympanum* it ſelf.

A, The *Malleus*.

B, The *Incus*.

C, The *Stapes* directly under the Eye; ſo that its Head is hid by the *Roſtrum* of the longer Branch of the *Incus*, tho' its *Baſis* may in this view ſomewhat appear as it covers the *Feneſtra Ovalis*.

D, The bottom or lower part of the *Tympanum*, which is the Surface of the *Os Petroſum*.

E, The *Feneſtra Ovalis*.

FG ... Half of the *Meatus* in which the internal Muſcle of the *Malleus* is incloſed.

F, That part of this divided *Meatus* that is without the *Tympanum*.

G, Its other part within the *Tympanum*.

H I, The bony part of the *Meatus*, which leads from the Palat to the Ear, divided through its middle to ſhew its Cavity.

I, The Extremity of the *Meatus*, in which the *Muſculus Stapedis* is incloſed.

FIG. XII.

The *Incus* view'd on that ſide where it is articulated to the *Malleus*.

A, The great end of the *Incus*.

B, Its ſhort Branch Foreſhorten'd.

C, Its long Branch.

D, Its firſt Cavity.

E, The Second———

F, A Protuberance ariſing between theſe two Cavities.

FIG. XIII.

That part of the *Malleus* is here chiefly repreſented which is articulated with the *Incus*.

A, Its Head.

B, Its Handle.

C, Its large *Apophyſis*.

D, Its firſt Protuberance, which is receiv'd in the Cavity of the *Incus* D, in the preceeding Figure.

E, Its ſecond Protuberance which is receiv'd at E in the ſame Figure.

F, The Cavity which receives the Protuberance F, Fig. ib.

FIG. XIV.

The *Malleus* as it appears when view'd, from the *Aquæduct*, that the Inflection of the Muſcles may be ſeen, eſpecially the internal Muſcles which paſs into the *Tympanum* to its inſertion on the *Malleus*.

AB, The *Malleus*.

C, The exterior Muſcle.

D, The interior———

FIG. XV.

Shews the Circumference of the *Tympanum* and the *Malleus* view'd from the inſide with its Muſcles in its proper Situation.

A, The Head of the *Malleus*.

B, Its Handle———

C, The external Muſcle of the *Malleus*.

D, Its Inſertion.

E, The internal Muſcle of the *Malleus*.

F, The place which it goes to, and makes an obtuſe Angle, and whence it is inflected to the Handle of the *Malleus*, to which it is inſerted under the external Muſcle.

GH, The Circumference of the *Tympanum*.

I, The great *Apophyſis* of the *Malleus* fore-ſhorten'd.

K, The leſſer *Apophyſis* to which the external Muſcle is inſerted.

LM, The Nervous Covering of the internal Muſcle ſomewhat open'd to ſhew that Muſcle.

That it may be better conceiv'd how theſe two Muſcles move the *Malleus*, and thereby ſtretch the Membrane of the *Tympanum* or relax it, their Inſertions do ſhew, that when the external Muſcle CD Acts only, the Extremity of the *Manubrium* B (or handle) is drawn outward, becauſe the head of the *Malleus* G is faſten'd in the *Tympanum*. But it both theſe Muſcles move together, the Extremity of the *Malleus* (being drawn inwardly by the internal Muſcle E F,) ſtretches the *Membrana Tympani*. For the external Muſcle C D draws or at leaſt tyes up the Head of the *Malleus*, which does not bear upon the *Tympanum* in H as it does in G.

FIG. XVI.

Shews the back part of the *Os Temporis* as big again as the Life, its Squammous part being here taken away, and the Bone cut through from the top to the bottom (according to the *Stria)* ſo that the Inciſion paſſes through the middle of the Maſtoid Proceſs: This Section is ſo made, that the *Stria* about the *Membrana Tympani* appears, as does alſo the place where the *Stria* is wanting. Here alſo may be ſeen the *Parietes* of the Bony *Meatus* next the Face looking downwards, and covering a part of the *Membrana Tympani*; and finally all the Sinuoſities of the Maſtoid Proceſs are laid open.

AA, The *Stria*.

a a, The ſpace in which the *Stria* is wanting.

B, The ſide of the Bony *Meatus* next the Face, in this view, lying downwards.

C, The *Malleus*.

D, The ſmall Cord of the *Tympanum* drawn inwards, that it may be ſeen how it paſſes on the external Muſcle.

b, c, A Sinuoſity in the Bone on the *Stria*, which gives the Muſcle the Benefit of a Pully.

E, The external Muſcle of the *Malleus* in like manner drawn inward.

FF, The bony part of the *Meatus* that leads to the Palat.

G, The *Meatus* to the Maſtoid Proceſs.

HHH, The Sinuoſities of that *Apophyſis*.

TAB. XXI.

From M. Du Verney.

FIG. I.

SHews the *Os Temporis* not exceeding its juſt Magnitude, and ſo prepar'd, that the *Stapes* may be ſeen in its proper place, together with the *Meatus* which goes from the Ear to the Palat.

A, The *Stapes* in its proper Situation.

BC, Part of the *Bony Canal.*

D, The Cartilaginous part of the ſame *Canal*, which is thick and large at its Extremity.

E, The inſide of the Membrane that inveſts the inſide of the Channel hanging down.

FIG. II.

Another View of the ſame Temple-bone exceeding its natural ſize, and ſo prepar'd, that the *Cochlea* and ſemicircular Channels appear in their natural Situation.

A, The Arched Roof of the *Veſtibulum.*

B, The *Feneſtra Ovalis* as it appears when the *Stapes* and Membrane that connects it are remov'd.

CDE, The three ſemicircular Channels in their proper Sight, C the ſuperior, D the middlemoſt, E the lowermoſt. The middlemoſt and lowermoſt in this Figure are open'd to ſhew their Cavities.

FIG. III.

Shews the top of the *Cochlea* taken off to its internal part, that the Semioval Spiral Channel may be ſeen.

FIG. IV.

Shews the *Spiral Lamina* ſuſpended as it were in the Air much bigger than the Life, with the Membrane which faſtens it to the Superficies of the *Channel.*

a, b, c, The *Lamina Spiralis.*

d, e, f, The Membrane which adheres to it.

FIG. V.

Shews the *Center* or Body of the *Cochlea* much bigger than its natural ſize, in which ſome marks of the turnings of the Spiral *Lamina* and the Channels may be ſeen.

a, b, c, The *Veſtigia* of the Turnings of the *Spiral Lamina* full of many little holes which afford paſſages of the Filaments of the *Auditory* Nerve.

d, e, f, Marks of the Extremities of the *Spiral* Channel.

FIG. VI.

Shews the *Veſtibulum* and the three Semicircular Channels open'd, that the diſtribution of the Veſſels may be ſeen in them.

a, The Branch of an Artery which enters the *Veſtibulum*.

b, Another Branch of the ſame Artery which enters by the common hole of the *Veſtibulum*, and is diſtributed to the ſuperior and inferior Channels.

c, The Branch that goes to the inſide of the middle Channel.

FIG. VII.

Shews the back part of the *Os Petroſum* very much magnified, the Bone it ſelf being raſped away, ſo much as is needful, to ſhew the Semicircular Convolutions and Cavity in which the Auditory Nerve ends.

A, The hole of the Auditory Nerve raſped.

BB, The Semicircular Ducts.

C, The *Baſis* of the Body of the *Cochlea* with divers ſmall holes in it, which afford paſſages to the Nervous *Fibrillæ* that are ſpread in all the Spiral turnings and windings.

D, The beginning of the *Meatus* by which part of the hard Nerve paſſes.

E, The hole by which a Branch of the ſoft Nerve paſſes, Fig. 8. E.

F, Another hole by which a third Branch of the ſoft Pair paſſes, expreſs'd Fig. 8. F.

FIG. VIII.

The Auditory Nerve magnified and freed from the *Os Petroſum*, that it may appear how this Nerve is divided within the *Meatus* of that Bone.

A, The Auditory Nerve divided into two Branches.

BB, Part of the ſoft Nerve.

CC, Part of that hard Nerve whoſe upper part is ſo expreſs'd in this Figure, that the *Fibrillæ* and Branches of the portion of ſoft Nerves may be ſeen. The Trunk of this Portion of the hard Nerve, is inſerted in the *Foramen* mark'd D in Fig. 7.

D, The great Branch of the ſoft Nerve divided into divers *Fibrillæ*, which inter into divers holes at the *Baſis* of the Body of the *Cochlea*, and are diſtributed into all its Spiral Turnings and Windings.

E, Another Branch of the ſoft Nerve, which enters by the *Foramen* mark'd E in Fig. 7.

F, The third Branch of the ſoft Nerve, which enters at the Foramen F of Fig. 7.

TAB.

TAB. XXII.

From M. Du Verney.

FIG. I.

SHews the upper part of the Temple-bone inclining a little, together with the Branch of the fifth Pair of Nerves, which is diſtributed into the left Cheek, and the Origin of divers of the Filaments which is called the *Corda Tympani*, as alſo the diviſions of the other Branch of the ſame Nerve which goes to the outward part of the Ear.

A, Part of the Squammous Bone of the Temples.

B, The *Maſtoid Proceſs.*

C, The *Styloid Proceſs.*

D, The *Zygomatick Proceſs.*

E, The *Meatus* that goes from the Ear to the Palat.

F, A Branch of the fifth Pair, chiefly diſtributed into the lower Cheek, and into the parts that joyn to it.

g h i k, Four Shoots from this Branch as ſoon as it comes out of the *Cranium.*

g, The firſt goes to the temporal Muſcle.

h, The ſecond to the external *Maſſeter.*

i, The third goes to the Muſcle call'd the *Buccinator* and Glands of the Cheeks.

k, The fourth goes to the *Muſculus Pterygoideus internus.*

C, Another Shoot which is ſent out from this Branch.

H, A part of this Branch, which is joyn'd with the hard Branch of the Auditory Nerve.

I, The diſtribution of the Branch G into the outward part of the Ear, whoſe outward Branches are cut off.

K, A Branch, which being cut off, goes into the lower Jaw.

LL, A Branch which goes to the ſide of the Tongue.

MM, A Branch going from thence, and aſcending backward over the bony part of the *Meatus* of the Aquæduct, and goes into the *Tympanum*, and is that which is commonly call'd the *Corda Tympani.*

N, The external Muſcle of the *Malleus* in its proper place.

FIG. II.

A, The *Proceſſus Maſtoides.*

B, The hinder part of the Ear ſeen.

C, The Trunk of the ſecond vertebral Pair.

a b c d e f g, Many Branches cut off, which the laſt mention'd Trunk ſends to the neighbouring Muſcles and vertebral Nerves.

DD, A Branch of the ſame Nerve, which paſſes by the back part of the Ear.

E, A Branch which ends in the *Auricula*, and in the *Cartilaginous Meatus.*

FIG.

FIG. III.

Shews the Ear of a Child of a Year old.

A, The under part of the Ear.

BB, Its Channel or Cartilaginous *Meatus*.

C, The Membrane that joyns the Cartilaginous *Meatus* to the bony *Annulus*, which in time grows hard, and chiefly makes up the bony *Meatus* of the Ear.

D, The bony *Annulus*.

E, The Proceſs of the *Os Jugale*.

FIG. IV.

Shews the fore-part of the temporal Bone of an *Embryo*.

A, Its Squammous part, whoſe little bony Fibres appear, as it is ſeen in ſome other Bones in the Skull of an *Embryo*.

a b, The Margin of its Circumference as yet Cartilaginous.

B, Part of the *Os Jugale*.

C, The Membrane of the *Tympanum*.

D, The bony *Annulus* with which the Membrane of the *Tympanum* is joyn'd.

E, The *Proceſſus Styloides* as yet Cartilaginous.

FF, The *Proceſſus Maſtoides* very ſmall.

d, The *Foramen*, through which the hard Branch of the Auditory Nerve paſſes out.

G, The conjunction of the Squammous part of the Temple bone with the Maſtoid-bone, united in an Adult.

H, The Channel in which that Carotid Artery paſſes.

I, The *Foramen* that goes from the Palat to the Mouth.

FIG. V.

Shews the hinder part of the Temple-bone.

A, The Squammous part.

BB, The place where it is ſeparated from the reſt of the *Os Petroſum*.

C, The ſuperior ſemicircular Channel unprepared.

D, The inferior——

E, The place where both Channels meet.

F, A remarkable Hollow which lies under the ſuperior Channel, and which in time is filled up and is not perceivable.

G, The *Foramen* for the paſſing of the hard Nerve.

H. The *Foramen* of the Auditory Nerve.

FIG. VI.

Shews the bony *Annulus* a little ſtooping that the *Striæ* may be ſeen.

FIG. VII.

Shews the ſame *Annulus*, but otherwiſe inclin'd, that the reſt of the *Striæ* may be viſible.

FIG. VIII.

This ſhews the hard Portion of the Auditory Nerve on different parts of the Face.

A, The Trunk of the hard part of the Auditory Nerve coming out of the *Cranium* through the *Foramen* that is between the *Proceſſus Maſtoides* and *Styloides*.

B B, A great Branch which is ſent from that Trunk to the Ear, whoſe ſmall Filaments are ſeen cut off.

C C, The inferior Branch which is diſperſed to the Chin, Muſcles and Teguments that lye under the lower Jaw.

a, The ſuperior Branch that is divided in a three-fold manner.

D b c d e, Five Branches of this Diviſion ſent into the Muſcles of the Temples, Forehead and Eye-lids.

f, A Branch of this Diviſion which goes into the middle of the Cheek, through the Branch of the fifth Pair (mark'd g) and becomes bigger.

h, The laſt Branch of this Diviſion, that ſends Filaments to the *Muſculus Buccinator* and Muſcles of the Lips.

i i, Two ſmall Filaments which ſeem cut off, becauſe they paſs into the *Orbita* of the Eye through their proper *Foramina*, which are in the firſt Bone of the upper Jaw.

T A B. XXIII.

FIG. I, II, V, VI, VII & VIII *from* Veſlingius. *The* IIId *from* Schneider. FIG. IV *from* Caſſerius. *The reſt from* Malpighius.

FIG. I.

A, THE Hairy Scalp ſeparated.

BB, The *Panniculus Carnoſus*, by ſome call'd *Pericranium*, alſo ſeparated.

C, The *Perioſtium*, by ſome not diſtinguiſh'd from the *Pericranium*, here ſeparated.

DD, The Skull bared.

E, The *Muſculus Frontis*.

FF, The *Orbicularis*, or *Clauſor Palpebrarum*.

G, The firſt Muſcle of the *Ala Naſi*, call'd *Pyramidalis*.

H, The *Muſ. Dilatator Alæ Naſi*.

I, A fictitious Muſcle call'd by Authors *Muſ. Dilatans Alas*, or *Circularis Naſi*.

K, *Muſ. Attollens Labiorum*.

L, *Zygomaticus*.

M, *Depreſſor Labiorum Communis*.

N, *Conſtrictor Labiorum*.

O, *Buccinator*.

PP, *Temporalis*.

Q, *Attollens Auriculam*.

R, *Retrahens Auriculam*.

S, *Maſſeter*.

T, *Digaſtricus* cut from its Original.

FIG. II.

AA, The Temporal Muſcles freed from their Originals, and left at their Inſertions a a, at the *Proceſſus Coronæ* of the lower Jaw.

BB, The *Muſculi Maſſeteres* ſeparated.

CC, Parts of the *Digaſtrick* Muſcles left at their Inſertions to the lower Jaw.

D, The *Muſculus Prerygoides internus* on both ſides.

EE, The *Plerygoides internus* on both ſides.

F, Part of the *Quadratus* ſeparated.

FIG. III.

That part of this Figure marked AAAA and B, is by no means intelligible either in this Copy, or in the Original of *Schneider*; C the Membrane as it inveſts the roof of the Mouth, D the *Foramen* of the *Os Occipitis*, by which the Spinal Marrow deſcends.

FIG. IV.

The back part of the *Larynx*, with its Muſcles, &c.

AA, The *Os Hyoides*.

B, The Concave part of the *Epiglottis*.

C C, The hinder Concave part of the *Cartilago Thyroides*.

DD, The *Par Cricoarytenoides poſticum*.

E, The Poſterior Membranous part of the Wind-pipe.

F, The *Muſculus Arytenoideus*.

FIG. V & VI.

A, That part of the *Os Hyoides* call'd its *Baſis*, Fig. 5. A Fig. 6. ſhews the internal concave part of its *Baſis*.

BB, The Horns of the *Os Hyoides*.

CC, The Cartilaginous Appendages.

FIG. VII.

The *Uvula* with the *Amigdalæ* or *Tonſillæ*.

A, The *Gargareon* or *Uvula*.

b b, The external Pair of Muſcles call'd *Perygoſtaphilinus*.

CC, The internal Pair call'd *Sphænoſtaphilinus*.

D, That part of the Palat from which the *Uvula* is continued.

BB, The *Tonſillæ*.

FIG. VIII.

1, 2, 3, 4, 5. The Tongue of a Quadruped divided into five parts.

A, Its *Apex* or Point.

B, Its middle.

C, Its *Baſis*.

FIG. IX, X, XI, XII, XIII.

Portions of the divided Tongue, in which are ſhewn the ſtrait courſe of its external Fibres, and the various Diſpoſitions of its internal Fibres.

9, The top of the Tongue cut off Tranſverſly.

A A, The carnous Fibres which paſs according to the length of the Tongue, and incloſe it on every ſide, by which the Tongue is drawn into the Mouth.

B, The fleſhy Fibres that paſs tranſverſly, and ſerve to narrow the Tongue.

C, The Perpendicular Fibres which leſſen it in its thickneſs.

D, The Membrane as yet covering the Tongue.

E, The carnous Fibres paſſing obliquely from the ſides to the upper Surface of the Tongue.

F, The ſtrait Fibres which are continued with the Muſcles of the Tongue.

G, The Angular Fibres (according to *Malpighius*) which draw the Tongue inwards.

HH, The Fibres which depreſs the ridge of the Back.

I, A Branch of a Nerve, which ends in the *Papilla* of the Tongue.

L L, The ſtreight Fibres, which compreſs the *Baſis* of the *Tongue*, between which are ſome ſmall Glands and Fat.

M, The *Baſis* of the Tongue.

N, The lower ſide of the Tongue in this Section.

FIG. XIV.

The *Baſis* of the Tongue cut Traverſe.

FIG. XV.

A piece of the Tongue with a Branch of a Nerve, and three ſorts of *Papillæ*.

FIG. XVI.

The Horny *Papillæ* with their two coverings.

FIG. XVII.

A A, One of the *Tonſillæ*, commonly call'd the Almonds of the Ears.

BB, The two larger Sinuſſes of the *Tonſillæ*.

CCC, The ſeveral little Orifices of Sinuſes that open into the larger.

TAB. XXIV.

FIG. I *from* Blaſius; II *and* V *from* Steno; III *and* IV *from Dr.* Wharton; VI *and* VII *from* Lewenhoeck; VIII *and* IX *from* Caſpar Bartholine.

FIG. I.

A, THE *Parotid* Gland in its natural Situation.

B, Its *Salival* Duct which paſſes through the *Muſculus Buccinator* into the Mouth.

C, A Probe in the *Salival* Duct.

FIG. II.

The *Salival* Ducts of a Calf.

a a a, The conglomerated Gland call'd *Parotis*.

b b, The Parotid *conglobate* Gland.

c c, The Lymphæducts tending downwards between the

Parotid *Conglobate* and *Conglomerate* Glands.

d d, The roots of the Salival Excretory Ducts.

e, The Trunk of the *Ductus Salivalis*.

f, The outward Branch of the *Jugular* Veins.

g g, The Nerves communicating as well without as within the Gland and Head.

i i, The Nervous Twigs accompanying the Salival Duct.

FIG. III & IV.

Shews the *inferior Maxillary* Gland, with its *Salival* Ducts in a Calfes Head.

A, The back part of the *inferior Maxillary* Salival Gland.

a a a a, The poſterior roots of the *Ductus Salivalis*.

B, The fore-part of the Gland.

b b, The anterior Roots of the ſame Ducts.

C, The Trunk of the Salival Ducts ariſing from the hinder Roots of the Salival Ducts a a, and marching over the *Tendon* of the *Digaſtrick* Muſcle.

D, The other part of the *Salival* Duct on the other ſide of the Tendon where it joyns with the foremoſt Roots b b.

E, The Union of all theſe Ducts into one common Trunk.

F G, The *Muſculus Digaſtricus* or *Biventer*.

H, The Progreſs of the Salival Duct towards the fore-teeth of the lower Jaw.

I, The opening of the *Ductus Salivalis* under the Tip of the Tongue near the *Dentes Inciſores* of the lower Jaw,

K, A round Glandule placed by the Jaw.

L, The row of Aſperities under the ſide of the Tongue.

M, The Tongue laid aſide to ſhew the endings of the Salival Duct at I.

N, The *Tonſilla*.

FIG. V.

The Muſculous Texture of the Tongue.

FIG. VI & VII.

A B, Two Scales taken from the internal Tunick of the Mouth, when view'd with a Microſcope. A certain Streak in them which contain little Globules.

FIG. VIII.

The Salival Gland of the lower Jaw of a Lyoneſs.

A, The *Gland* of the lower Jaw.

B, Its *Salival* Duct, diſcover'd by Dr. *Wharton*.

C, The *Glandula Sublingualis*.

D, Its *Salival* Duct, firſt diſcover'd by *Caſ. Bartholine*; the various Ramifications of which, appear diſpers'd through the whole Gland.

FIG. IX.

Shews the two Mouths of the inferior Salival Ducts on both ſides, *viz.* that of Dr. *Wharton* and of *C. Bartholine*.

a a, Two Briſtles or Wiers inſerted into the Mouths of thoſe Ducts on both ſides.

b, The Tongue turn'd aſide to ſhew the Orifices of the Ducts and the lower Jaw C.

TAB. XXV.

From Bidloo.

FIG. I.

IS a Fictitious Figure of the Muſcles of the *Fauces* and *Oeſophagus*.

FIG. II.

Shews the Stomach revers'd in this Print.

AA, The *Fundus* of the Stomach.

B, The lower part of the *Gula* or *Oeſophagus*.

C, The *Pylorus* or right Orifice here repreſented the left.

D, The *Omentum* hanging down which lies on the Guts.

N. B. In this Figure the ſuperior and inferior *Coronary* Blood-Veſſels of the *Stomach* are very well expreſs'd; the lower parting with ſlips to the *Omentum* as well as to the Stomach.

FIG. III.

The Texture of the *Peritonæum* examin'd by a Microſcope.

AA, The *Nervous* and *Tendinous* Fibres, which paſs according to the length of the *Abdomen*.

BB, Other Fibres carried in a circular manner from the *Nervous Plexus* through the breadth of the *Abdomen*.

CC, The *Fibrillæ* which joyn the preceeding Fibres together, are complicated with them.

D D, Parts of the Blood-Veſſels broke off.

FIG. IV.

The Proceſs of the *Peritonæum* on the Spermatick Veſſels.

AA, Part of the *Peritonæum*.

B, the Orifice or *Annulus* of its Proceſs.

CC, The Blood-Veſſels which paſs to the *Teſticles*, on which the internal *Lamina* of the *Peritonæum* is continued in half their progreſs between the *Inguina* and *Scrotum*, and is by ſome call'd *Diverticulum*, while the external *Lamina* of the *Peritonæum* is not only continued on thoſe Spermatick Veſſels, but provides a covering alſo for the *Teſticle* it ſelf, which is called *Tunica Vaginalis*.

TAB. XXVI.

FIG. I, II & IV *from Dr.* Willis, *the* IIId *from* Bidloo.

FIG. I.

THE Stomach taken out and blow'd up, with its Blood-Veſſels ſo diſtended, that the great Trunks and Branches of its Veins and Arteries appear.

C, The *Oeſophagus.*

G E, The Mouth of the Stomach, or left Orifice.

AD, The Right Orifice call'd the *Pylorus*, with the *Duodenum* continued to it; R.

Note, That A is by miſtake alſo placed on the *Fundus* of the Stomach of this Figure as is FF.

B, The lower part of the Stomach.

Q, The Valve at the *Pylorus.*

R, A cluſter of Glands in the *Duodenum.*

FIG. II.

This is patch'd together from Dr. *Willis*, but ſo very ill compos'd, that no Explication can afford any tolerable *Idea* of what it pretends to repreſent, wherefore it ſhall be paſſed by.

FIG. III.

S, The right Orifice of the Stomach.

T, The left Orifice when cut off, after the Stomach was blown up and dry'd.

FIG. IV.

N. A Portion of the internal Membrane of the Stomach; in which, its internal Concave Surface is exhibited, to ſhew the Foldings of that Membrane cover'd with its *Villi*,

O, A piece of the Downy or Glandulons Coat, in which its outward Superficies (that cleaves to the Nervous or Vaſcular Coat) appears very full of Glandules, and the Mouths of Veſſels.

P, A piece of the Nervous Coat, in which, the downy Cruſt being remov'd, its inner or Concave Superficies appears with thick Branchings of Blood-Veſſels.

TAB. XXVII.

FIG. I & II *according to Dr.* Willis, *the* Vth *from* Peyerus, *the reſt from* Swammerdam *and* Bartholin.

FIG. I.

A, THE external Membrane of one of the ſmall Guts, which is borrow'd from the *Peritonæum*, and being very thin, the Longitudinal Fibres (which are placed immediately under it) do ſomewhat appear through it.

B, The Longitudinal Fibres of the Gut, cleared of the external Membrane.

C, The Circular Fibres which appear immediately under the Longitudinal: Theſe two orders of Fibres are counted the ſecond Tunick of the Inteſtine by Dr. *Willis*.

FIG. II.

B, The internal Concave Surface of the Nervous or Vaſculous Tunick, raiſed from the Villous Tunick, to ſhew its Veſſels.

A, The external convex'd Surface of the Villous Tunick made bare, to ſhew its Glands and Mouths of its ſmall Blood-Veſſels.

FIG. III.

A, The external Surface of the Gut.

BBB, The Villous Tubes of the internal Surface of the Gut, in whoſe edges the ſmall Channels appear.

FIG. IV.

Part of the *Inteſtinum Jejunum* dry'd and cut open.

A, Part of the Gut, call'd *Jejunum*.

B, Its inſide.

CC, Part of it divided and hanging down, to ſhew its inſide.

a a a, The *Valvulæ Conniventes*.

b b b, The external Marks of the *Connivent* Valves on the Surface of the Gut.

FIG. V.

A, The lower end of the *Ileum* cut open and expanded, to ſhew its inſide.

B, The large Glandulous *Plexus* at the Extremity of the *Ileum*.

CC, The Valve of *Bauhinus* divided, in whoſe *Limbus* the *Solitary* Glands appear.

DD, A Portion of the *Colon* divided alſo according to its length and ſpread open, to ſhew its Glandules alſo.

EE, The Lenticular Solitary Glands, diſperſed through the inward Tunick of the *Colon*.

F, The *Pſeudocæcum* or Vermiform Proceſs, commonly taken for the *Cæcum*, here expreſs'd with its inſide outmoſt, to ſhew its Lenticular Glands.

G, The outſide of the *Colun.*

H, Part of the *Colon* raiſed to ſhew its inſide.

I I, The *Connivent* Valves.

K, The ſpace between the *Connivent* Valves open'd.

L L, The *Cells* made by the external Ligament of the *Colon*, on dividing which Ligament, this Gut loſes thoſe Prominencies, its ſides becoming ſtreight.

M, The *Inteſtinum Cæcum* of the Antients, call'd by ſome *Sacculus Stercoraceus.*

TAB. XXVIII.

FIG. I.

DOne after the Guts and Meſentery, and ſome *Quadrupeds*, ſhews the *Meſentery* and its Veſſels, with the *Chyliferous* Receptacle and *Thoracick* Duct.

A, The *Ventricle* out of its proper Situation.

C C C, The *Meſentery* connected to the *Jejunum.*

EE, The greater and leſſer Glands of the *Meſentery*, whereof the greateſt is call'd the *Pancreas Aſellii.*

FFF, The *Lacteal* Veſſels with their Valves.

G, The Trunk of the *Meſenterick* Artery.

HH, The Trunk of the *Meſenterick* Vein.

III, The *Lacteal* Veſſels of the ſecond ſort, together with their Valves, which look from the *Meſenterick* Glands towards the *Receptacle* of the *Chyle.*

KKK, The *Lymphatick* Veſſels that go from the *Liver* into the *Sacculus Chyli.*

L, The *Receptacle*, or *Ciſteru*, or *Chyle-bag.*

MM, Part of the *Chyliferous* Duct, with their Valves.

N, The *Intercoſtal* Nerves, which make divers *Plexus*'s in the *Meſentery.*

O, The *Lacteal* and *Blood*-Veſſels, as they appear under the *Tunick* of the *Inteſtine.*

P, The exterior *Tunick* ſeparnted and hanging down.

FIG. II.

Shews the *aſcending Chyliferous Duct*, with its divers Branches.

A A, The upper aſcending part of the Chyliferous Duct, which was continued with MM of the foregoing Figure.

B, Its various Fiſſures and Branchings between the fourth and ſixth *Vertebra* of the *Thorax*, through which ſome *Intercoſtal*

Branches go from the great Artery; this Diviſion often varies as in C and D.

E E, The Inſertion of this Duct in the *Subclavian* Vein, at whoſe Orifice there is a *Semilunary* Valve.

F, The Inſertion of the other Branch into the *Jugular* Vein.

FIG. III. From *De Graaf.*

Shews the true *Pancreas* with its Duct.

AAAA, The *Pancreas* open, that its Duct may appear.

BBBB, A great many Glands *conglomerated* which compaſs the *Pancreas*.

CCG, The Duct or Trunk of the *Pancreas*, running according to its length.

D D D, Lateral Ducts or Branches ariſing on both ſides of the great Trunk, and diſperſed into the Subſtance of the *Pancreas*.

EE, The *Inteſtinum Duodenum* opened, that the Inſertion of the *Pancreatick* Duct may be ſeen.

F, The entrance of the common *Pancreatick* and *Biliary* paſſage into the *Duodenum*, about four Fingers breadth under the *Pylorus*.

GG, The *Cyſtick* and *Hepatick* Duct.

H, The common *Biliary* Duct inſerted in the *Duodenum* F, and freed from the *Pancreas*, under which it lay hid.

TAB. XXIX.

FIG. I *from* Bartholin, *the* IIId *from* Veſlingius, *the reſt according to Dr.* Gliſſon, *but alter'd by* Blancard.

FIG. I.

THE hollow part of the Liver revers'd.

AA, The lower ſide or *Concave* part of the *Liver*.

B, Its external *Membrane* ſeparated and hanging down.

CC, Two Trunks of the *Vena Cava* near the *Gibbous* part of the *Liver*.

D, The *Umbilical* Vein turn'd into a *Ligament*.

E, The Gall-Bladder on which a Lympheduct is expreſs'd,

Near F the *Ductus Cyſticus* of the Gall-Bladder is expreſs'd.

g, The *Ductus Hepaticus*.

h, The common *Gall-Duct*.

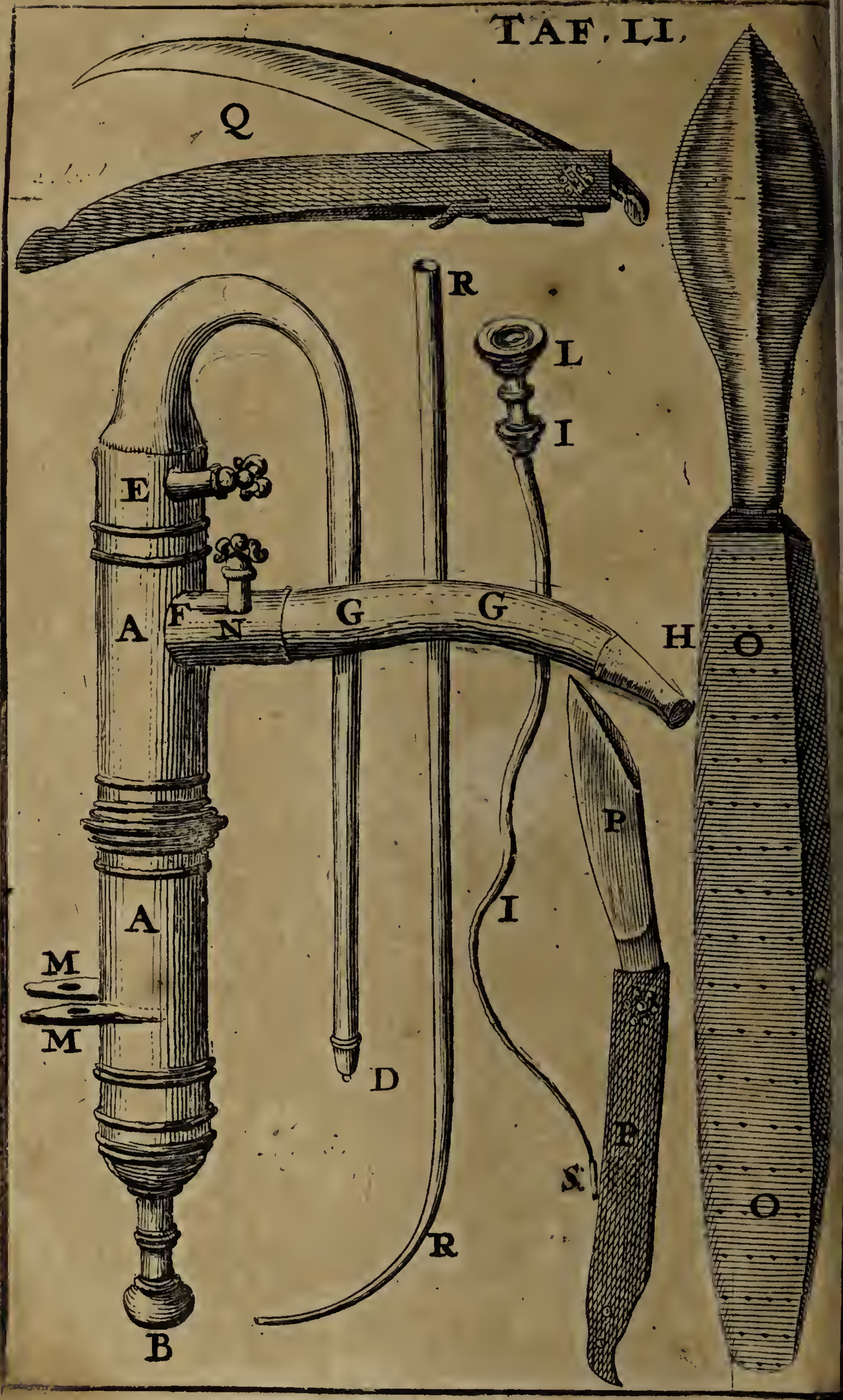
I, One of the Arteries of the Liver.

K, The Branch which comes from the Cæliack Artery.

L, The Branch of the Artery which goes to the *Gall-Bladder*.

M, The

TAF. LI.



M, The Nerve from the *Intercoſtalis.*

N, A ſmall Lobe of the Liver to which the *Omentum* is annex'd.

O, Another Lobe or Eminence call'd one of the *Portæ.*

P, A *Lymphatick* Gland.

QQ, The *Lympheducts* ariſing out of the Liver, which are here expreſs'd very large, not being done after the Life.

RR, Other Lympheducts ariſing out of the Gland (PP) into which the former were inſerted, which convey the *Lympha* immediately from thence into the *Sacculus Chyli.* N. B. This Progreſs of Lympheducts is true in Nature, tho' it is here done from Invention.

FIG. II.

Shews the *Capſula* of Dr. *Gliſſon*, together with the *Vena Portæ*, and the Ramifications of the *Hepatick* Ducts.

a a a, The common *Capſula* of Dr. *Gliſſon* opened.

B, The Trunk of the *Vena Portæ* towards the Gibbous part of the Liver.

cccc, The five Branches of the *Vena Portæ* diſtributed through the whole Liver.

D, The Subdiviſions of the *Gall*-Duct, included in the common *Capſula* as they paſs to the Glandulous Bodies at the Extremities of the *Porta* and the other Veſſels.

E, The common *Gall* Duct.

F, Its opening into the *Duodenum.*

G. The *Gall*-Bladder open'd.

H, The *Ductus Cyſthepatici*, which ariſe from the Liver, and diſcharge their *Gall* into the *Ductus Cyſticus*, and Neck of the *Gall*-Bladder.

i i i, Their Apertures.

k k k, The Communication of the *Cyſtick* and other *Gall*-Ducts.

FIG. III.

A A, The gibbous part of the Liver.

B, Its external Membrane ſeparated.

C, Its Ligament called *Suſpenſorium.*

D, The *Vena Cava* dividing it ſelf into Branches, as they come out of the Liver.

FIG. IV.

A, The *Gall*-Bladder open'd.

B B, The *Ductus Hepaticus.*

CCC, The *Ductus Cyſthepatici.*

D, The *Ductus Hepaticus* open'd, that the *Cyſthepatici* may be ſeen.

E, Another opening of the *Cyſthepatick* Ducts into the *Gall*-Bladder, where a Valve is placed to prevent the return of the *Gall.*

FF, A *Gall*-Duct paſſing out of the Bladder into the Liver.

GG, The *Ductus Cyſticus* joyning with the *Ductus Hepaticus* and *Communis.*

HHH, Branches of the *Cyſthepatick* Ducts diſpers'd through the inſide of the Liver.

I, *Vena Portæ.*

K, The *Ductus Communis* which carries the *Gall* to the *Duodenum.*

TAB. XXX.

FIG. I.

AAAA, THE Concave part of the Spleen from *Veſlingius*, with the addition of the Lympheducts.

B, The Splenick Artery.

CC, The *Vena Portæ*.

DD, The Lymphatick Veſſels with their Valves.

E, The Intercoſtal Nerves.

FIG. II.

Shews the *Spleen* of an Ox from Dr. *Highmore*.

A A, The Subſtance of the *Spleen* cover'd with its proper *Tunick*.

BB, The *Tunick* of the *Spleen* diſſected and turn'd inſide outwards, that the progreſs of the Veſſels, and the *Plexus* of the Fibres may be ſeen better.

C, A part of the *Vena Portæ*.

D, Its left Branch called the *Splenick*.

E, That Branch opened near the *Spleen* that the *Valve* may be ſeen.

F, A part of the *Splenick* Artery, which goes through the whole *Spleen*.

G, Nerves that go through the ſides of the *Splenick* Artery.

H H H, The Artery going through the whole *Spleen*.

I I I, Nerves going through the ſides of the *Splenick* Artery.

KKKK, Some Nervous *Fibres* very much complicated, between which the Branches of the Artery run, and are loſt in its veſiculous Subſtance.

N.B. Tho' Authors, particularly Dr. *Highmore*, have deſcrib'd *Valves* in the *Vena Portæ*, it is certain it has no *Valves* in it.

FIG. III.

Shews the Trunk of the *great* Artery, and the *Vena Cava*, &c. from *Veſlingius*.

AA, The right and left Kidny in their proper place.

B, Its *Tunick* ſeparated and hanging down.

CC, The *Glandulæ Renales*.

DD, The Trunk of the *Vena Cava*.

GG, The Trunk of the great Artery.

HH, The Emulgent Veins.

I I, The *Emulgent* Arteries.

c c, The *Arteries* of the *Teſticles*.

d d, The *Veins* of the *Teſticles*.

e e, The Spermatick Blood-Veſſels as they paſs to the Teſticles in one common covering of the *Peritonæum*.

f, The *Arteria Adipoſa*.

g, The *Vena Adipoſa*.

h h, The *Ureters*.

KK, A branching of the *Arteries* going towards the Thighs.

LL, A branching of the *Vena Cava* going towards the Thighs.

FIG. IV.

AAA, The Kidny diſſected in the middle.

BBB, The *Urinary Pipes* ariſing from the Glands of the Body of the Kidny, and paſſing towards the *Papillæ*.

ddd, The glandulous *Acini* diſperſed between the Urinary paſſages.

gg, The interior *Urinary Pipes* going from the glandulous *Acini* into the *Pelvis*, whoſe meeting together make as it were Caruncles, from which the Urine paſſes into the *Pelvis*.

hh, The *Caruncula* made by the meeting of the Urinary Pipes.

I, The *Pelvis*.

KKK, The beginnings of the *Pelvis* in the Kidny.

L, Part of the *Ureter* cut off.

FIG. V.

AA, A Childs Kidny divided into divers little Bodies, or Lobes, cover'd with one common Membrane.

bbb, Many Protuberancies of the little Bodies not yet joyned together.

c, The *Emulgent Artery*.

d, The *Emulgent Vein*.

e, The *Ureter*.

FIG. VI.

AAAA, The Urinary Pipes of the *Pelvis*.

B, The *Pelvis*.

ccccc, The open ends of the Pipes of the *Pelvis*, which receive the *Caruuculæ*.

D, Part of the *Ureter* cut off near the *Pelvis*.

TAB. XXXI.

FIG. I, III, IV & V *from* Bidloo.

FIG. I.

Repreſents part of the *Liver* boiled, view'd through a Microſcope.

A A, The *external Tunick* of the Liver rais'd.

BBBB, The *Glands* that compoſe the Liver.

C, The *Fibrous* and *Membranous* Connexion of theſe Bunches of *Glands*.

DE, The *Sanguinary* and *Biliary* Veſſels diſtributed to the *Glands*.

FIG. II.

Shews the Kidny diſſected from the gibbous part to the *Pelvis*.

AAAA, The glandulous *Acini* diſpers'd through the Kidnies.

BBBB, The *Urinous* Pipes, which convey the Urine from the glandulous *Acini* into the *Pelvis*.

C, The *Pelvis*.

D, The Mouth of the *Ureter*.

FIG. III.

Shews the Veſſels of the *Kidnies*, *Pelvis* and *Urinous* Ducts.

AAAA, One half of the Kidny diſſected from the other.

BBBB, Urinary Pipes going from the glandulous *Acini* to the *Pelvis*.

CCCC, The glandulous *Acini*.

D, The *Pelvis*.

E, The *Ureter*.

FFF, The Emulgent Veſſels.

FIG. IV.

The whole Kidny divided from its gibbous part to the *Pelvis* and diſplay'd.

AAAA, The Kidny diſſected.

BB, The Urinary Pipes.

CCC, The *Glands* which compoſe the external Surface of the Kidny.

D, The *Pelvis*.

EEEE, The places where the Urine comes out of the glandulous Pipes into the *Pelvis*, call'd the *Carunculæ*.

F, The way out of the *Pelvis* into the *Ureter*.

G. The *Ureter* paſſing down.

FIG. V.

The Blood-Veſſels and *Urinary* Tubes of the Kidny, expreſs'd by a Microſcope.

A, The *proper* Membrane of the Kidny.

BB, The ends of the Blood-Veſſels broke off.

CC, The Blood-Veſſels of the Kidny, which help to compoſe its *Glands*.

DD, The *Glands* of the Kidny compoſed of *Blood-Veſſels*, *Urinary Tubes*, *Nerves* and *Lympheducts*.

E, The *Urinary Tubes* in their way from the *Glands* to the *Papillæ*.

F, The *Urinary Tubes* cut off, which paſs'd to *Glands* beyond thoſe here expreſs'd.

G, The *Caruncula* or *Papillary* Body fram'd by meeting of the *Urinary Tubes*.

H, A Branch of the *Pelvis* cut off, which receives the Urine from the Tubes of the *Caruncula*.

TAB. XXXII.

From Regn. de Graaf.

FIG. I.

a, THE Trunk of the Vein of the *Teſticle* cut from the *Vena Cava*.

bb, Branches of this Vein which ariſe from the *Peritonæum*.

c, Its firſt diviſion into two Branches, which are variouſly ſubdivided and united again.

ddd, The *Valves* which appear like Knots when the Vein is diſtended with Wind or Wax.

eee, The various Diviſions and Unions of the Veins, by which the refluent Blood (after the *Semen* is prepared in the Teſticle)

Teſticle) if it ſhould be detain'd in one Ramification, may return towards the Heart again by the other.

FF, The *upper* part of the *Teſticle* from whence theſe Branches may be ſaid to ariſe.

ggg, The *Ramifications* of the Blood-Veſſels of the *Teſticle.*

H, The *Body* of the *Teſticle.*

I, The *large round end* of the *Epididymis* firmly cleaving to the upper part of the *Teſticle.*

S, The *middle* part of the *Epididymis* looſly cleaving to the *Teſticle.*

K, The *leſſer* round part of the *Epididymis*, firmly cleaving to the lower part of the *Teſticle.*

LL, The *Vas Deferens* cut off near its *middle* between the *Teſticle* and the *Veſicula Seminalis.*

M, The *Artery* of the *Teſticle* paſſing from the *Aorta* to the *Teſticle.*

N, Its *diviſion* into two Branches.

O, The *larger* Branch which is implanted into the upper part of the *Teſticle*, and deſcends along its back towards the lower part of the *Teſticle* R, to which, the leſſer end of the *Epididymis* is annex'd; which again paſſes back on the Belly of the *Teſticle*, where it is divided into divers Branches.

P, The *leſſer* Branch which runs to the *Epididymis.*

R, The *greater* Branch *deſcending* on the *Teſticle.*

FIG. II.

The *Vas Deferens* and part of the *Epididymis* unravell'd.

A, Part of the *Vas Deferens* in which its Cavity may be ſeen.

B, The *Serpentine* Turnings, about the middle of the *Epididymis*, unravell'd.

C,D,E,F,g, Divers parts of the *Epididymis* ſo unravell'd, that its whole body appears to be one continued Veſſel folded up, which grows ſtill leſs and leſs as it approaches the upper part of the *Teſticle.*

H, The *larger* end or beginning of the *Epididymis*, near which its Veſſel (or ſingle Trunk) is divided into *divers Branches.*

I, The *Belly* of the *Teſticle.*

K, The *Artery* of the *Teſticle*, which aſcends from the lower part of it though its Belly.

L, The *Ramifications* of the Veins of the *Teſticle.*

FIG. III.

A, The *Veſſels* of the *Teſticles* incloſed in their common Trunk.

b b, The *Veins* of the *Teſticles* running to the ſides of the *Teſticles.*

B, The Tunick *Elythroides*, or *Erythroides.*

c, The *Artery* aſcending through the Belly of the *Teſticle.*

D, The *Albugineous* Tunick incloſing the *Teſticle.*

E, Part of the *Tunica Vaginalis* drawn back.

F, The *Cremaſter* Muſcle hanging down.

g, The *greater* round end of the *Epididymis.*

H, The *middle* part of the ſame.

I, The *leſſer* end of the ſame.
K, The *Vas Deferens* cut off.

FIG. IV.

Shews a *Dogs* Teſticle.

A, The *Blood*-Veſſels as they lye in their proper covering.

B, Their *Branches* tending to the *Epididymis*.

C, The *chief* Branch of the Artery of the Teſticles paſſing through the Belly of the Teſticle.

EE, The Branchings of the *Veins*.

F, The Teſticle with the *Seed* in it.

g, The *greater* end of the *Epididymis* full of *Seed*.

H, The *leſſer* end of the ſame extended with the *Seed*.

I, The *end* of the *Epididymis*, or the *beginning* of the *Vas Deferens*.

K, The *Vas Deferens* bound about in the *Inguen* of a Dog before *Coition*, without hurting the *Vaſa Præparantia*, that the *Seminary* Veſſels, when full of Seed, may be ſeen diſtended.

FIG. V.

a, The *greater* end of the *Epididymis* turn'd *inſide* outwards, that the Ducts and Branches of the *Epididymis*, and their courſe, may be view'd.

B, The upper part of the Teſticle, from which the *Seminal* Veſſels go, which compoſe the greater end of the *Epididymis*.

c, The *Veſſels* of the Teſticles cut off.

ddd, The *Branchings* of the Veſſels of the Teſticles.

E, The *Body* of the Teſticle of a *Dog*.

FIG. VI.

A, The Teſticle of a *Dog* cut a-croſs.

BBB, The *Seminal* Veſſels as they lye between the Membranes in a peculiar order.

C, The Root of the *Epididymis* deſcrib'd by Dr. *Highmore*.

FIG. VII.

AAAA, The *Seminal* Veſſels of the Teſticles placed in a peculiar order between the ſmaller Membranes.

B, The Seminal Veſſels going through that Membranous Subſtance that joyns to the back of the Teſticles.

C, Divers *Seminal* Veſſels perforating the *albuginous* Tunick cut off, before they make up the round end of the *Epididymis*, after a Serpentine manner, as may be ſeen in Figure II. H.

DDDD, The *albugineous* Tunick open'd in the fore-part of the Teſticle, and ſeparated from it.

FIG. VIII.

A, The *Teſticle* cut a-croſs.

BBB, The ſeveral Diſpoſitions of the *Seminal* Veſſels.

C, The *meeting* of all the Membranes which part the Seminal Veſſels at the *back* of the Teſticle.

FIG. IX.

AA, The Body of the *Proſtates* divided in the fore-part.

B, The *Urethra* open'd alſo in the upper-part.

CCC, The *Ducts* of the *Proſtatæ* or *glandulous* Body denudated.

O, The *place* of the *Caruncle* through which the *Seed* paſſes from the *Teſticles* and *Veſiculæ Seminales*, into the *Urethra*.

FIG. X.

A, The *Bladder* of *Urine*.

B, That part of the *Bladder* to which the *Urachus* is joyn'd.

C A, The *Bladder* open'd in the fore-part.

d d, The *Ureters*.

E E, The *Orifice* of the *Ureters* in the *Bladder*.

F, The *Neck* of the Bladder open'd.

g g, Parts of the *Vaſa Deferentia* cut off.

h h, *Veſſels* going to the *Veſiculæ Seminales*.

I I, The *Veſiculæ Seminales* diſtended.

K, The *Caruncle* with its two *Foramina* through which the Seed paſſes from the *Veſiculæ Seminales* into the *Urethra*.

LL, The *glandulous Body* or *Proſtates* divided in the fore-part.

MM, The *Mouths* of the Ducts of the *Proſtates* opening at the ſides of the *Caruncle*, which if not diſtended are imperceptible, or ſeem no bigger than Points.

FIG. XI.

A, The *Artery* of the Teſticle, as it is generally found in Humane Bodies.

B, The *Diviſion* of the *ſame* Artery into two Branches.

CC, The *greater* Branch going to the Teſticle.

DD, The *leſſer* Branch paſſing to the *Epididymis*.

E, The *greater* end of the *Epididymis* joyning to the Teſticles.

FF, The *Epididymis* turn'd inſide outwards, to ſee which way the Artery goes under it.

G, The end of the *Edididymis*.

H, A part of the *Vas Deferens*.

TAB.

TAB. XXXIII.

From De Graaf.

FIG. I.

SHews the Communication of the *Vaſa Deferentia* with the *Veſiculæ Seminales.*

AA, Parts of the *Vaſa Deferentia*, with ſmall Cavities appearing in their thick ſides where they are cut off.

B, Thoſe parts of the *Vaſa Deferentia*, where their Cavities are dilated, and their ſides thinner.

CC, The Extremities of the *Vaſa Deferentia* again contracted, and opening with a ſmall *Foramen* into the Neck of the *Veſiculæ Seminales.*

DDEE, The *Veſiculæ Seminales*, blow'd up to ſhew the Turnings and Windings of their Surface.

FF, The Veſſels paſſing to the *Veſiculæ*——

g, The Membranes which hold the *Veſiculæ Seminales* and *Vaſa Deferentia* in their natural Situation.

HH, The Blood-Veſſels that accompany the *Vaſa Deferentia*, and give Branches to their ſides.

I, The common Ducts to the *Veſiculæ Seminales* and *Vaſa Deferentia*, which paſs diſtinctly on each ſide to their Appertures, at the ſides of the *Caput Gallinaginis* or *Caruncula.*

KK, The Orifices of the Ducts of the *Proſtates*, which open into the *Urethra* of the ſides of *Caput Gallinaginis* or *Caruncle.*

LL, The *Proſtatæ* and *Urethra* divided on their fore-parts, to ſhew the inſide of the

MM, *Urethra.*

FIG. II.

The back parts of the *Penis*, *Veſiculæ Seminales* and *Proſtates.*

AA, Portions of the *Vaſa Deferentia.*

B, Thoſe parts of the *Deferentia* which are dilated.

CC, The Veſſels that go to the *Veſiculæ Seminales.*

DD, The *Veſiculæ Seminales* blow'd up.

EE, The back-part of the *Proſtates* which lay on the *Inteſtinum Rectum.*

F, The *Urethra.*

g, The meeting of the *Vaſa Deferentia* with the *Veſiculæ Seminales.*

HH, The *Muſculi directores Penis.*

I, The *Muſculus Accelerator* rais'd on one ſide.

L, The Bulbous part of the *Urethra* underneath.

M, The *Urethra* with its ſpongious part on it.

NN, The Nervous Bodies of the *Penis*.

O, The *lower* part of the *Glans*.

FIG. 12.

AA, The two Veins which joyn into one Trunk on the *Dorſum penis*.

B, The Vein of the *Dorſum Penis* open'd to ſhew a *valve* in it.

FIG. 3.

The *Penis* divided according to its length from its upper part or *Dorſum* to the *Urethra*.

AA, The *Nervous* or *Cavernous* Body of the *Glans* divided.

BB, The *Membranes* or *Capſulæ* of the *Cavernous* Bodies drawn aſide.

C, The *Artery* of on ſide paſſing through the *ſpongy* ſubſtance of the *Cavernous* Body.

D, The *Membranaceous ſpongy* ſubſtance in which the Artery paſſes.

EE, The *ſeptum intermedium*.

FF, The Fibres of the *ſeptum intermedium* which aſcend to the *Dorſum Penis*, and are divided like the Teeth of a Comb.

GG, The *Urethea* cut off near the *Proſtates*.

H, The middle part of the *Urethra*.

I, Its end which perforates the *Glans*.

KK, The *ſpongy* ſubſtance of the *Urethra*.

LL, The beginnings of the *Cavernous* Bodies dilated like two little Bags.

MM, The *Muſculi Erigentes* or *extendentes penem*.

FIG. 30.

The ſide of the *Penis* open'd according to its length.

AA, The *Glans* bor'd.

B, The *Frenum*.

CC, A portion of the *Skin* remaining, from whence the reſt that cover'd the *Penis* is cut off.

DD, The *Urethra* lying under the *Nervous* Bodies.

EE, The *Membrane* or *Capſula* of the *Nervous* Body divided.

FF, The Artery running through the *ſpongy* ſubſtance of the *Nervous* Body.

GG, The *ſpongy* ſubſtance of the *Nervous* Body.

HH, The *Orifices* of the two Arteries cut off as they paſs the *Corpora Nervoſa*.

I, The *Cavity* of the *Urethra*, whoſe lower part is cover'd with

K, Its *proper Cavernous* ſubſtance.

LL, The *ſeptum intermedium* of the *Corpora Cavernoſa Penis*.

Note, That theſe Letters refer to the original Figure of *De Graaf*, but are ill placed here, either thro' the Inadvertency of *Blancard*, or his Graver; the like may be ſaid of many more of theſe Figures, wherefore the Curious muſt have recourſe to the Originals.

FIG. 4.

Part of the *Penis* cut Tranſverſly.

AA, The *ſpongy* and *fibrous* ſubſtance of the *Nervous* Bodies.

bb, The two Arteries which paſs through the *Corpora Cavernoſa*.

C, The *Meatus Urinarius*.

D, The *ſpongy* ſubſtance of the *Urethra*.

E, The *ſeptum intermedium*.

FF, The *Capſula* or *ſtrong* Membrane of the *Corpora Nervoſa*.

G, The *thin* Membrane on the Cavernous ſubſtance of the *Urethra*.

H, The large Vein paſſing on the back of the *Penis*.

FIG. 5.

The *Pudendum* of a Woman.

A, The *Glans Clitoridis*.

B, Its *Præputium*.

CC, The *Nymphæ*.

D, The *Meatus Urinarius*.

EEE, The Coarctation of the Orifice of the *Vagina* as we found it, (ſays *De Graaf*) in a Virgin of 24 years old.

F, The Orifice of the *Vagina* a little dilated.

GG, The *Labia pudendi* drawn from each other.

H, The Seam or little Bridle of the Lips.

I, The *Perinæum*.

K, Part of the *Anus*.

FIG. 6.

The forepart of the *Clitoris*.

A, The *Clitoris*.

B, Its *Crura*.

C, Its *Glans*.

D, Its *Præputium*.

EE, The *Nymphæ*.

FF, Part of the *Perioſteum* by which the *crura* of the *Clitoris* is annext to lower part of the *Oſſa Pubis*.

GG, The Muſcles of the *Clitoris*.

HH, Thoſe parts of its Muſcles implanted on the *Oſſa Iſchii* or *Coxendicis*.

II, The Nerves,
KK, The Arteries,
LL, The Veins,
} which paſs to all the parts of the *Pudendum*.

MM, The fleſhly Fibres of the *ſphincter* Muſcle annext to the Nervous ſubſtance of the *Clitoris*.

FIG. 7, and 8.

Parts of the *Clitoris* variouſly diſſected.

A, Fig. 7. The *ſpongy* ſubſtance of one of the *Crura* without a *ſeptum intermedium*.

A, The *Clitoris*.

B, The *Glans Clitoridis* with parts of the *Nymphæ*.

CC, The *ſpongy* ſubſtances of the *Clitoris* divided from each other by a *ſeptum*.

FIG. 9, 10, 11.

Shews the Conformation of the Orifices of the *Vagina*, as they are found in young Bodies of different Ages.

Fig. 9. repreſents the *Pudendum* of an Infant.

Fig. 10. repreſents the *Pudendum* of a Girl of ſix years.

A, The Orifice of the *Vagina*.

BBB, The wrinklings of the Membranes about the Orifice of the *Vagina* call'd the *Hymen*.

C, The Orifice of the *meatus Urinarius*.

DD, The Lips drawn from each other.

E, The *Clitoris*.

FF, The *Nymphæ*.

Fig. 11. The ſame *Pudendum* after its upper part is diſſected.

A, The Orifice of the *Vagina*.

BB, Its *rugous* Membrane call'd *Hymen*.

CCC, The forepart of the *Vagina* cut off.

DD, The *Meatus Urinarius* divided through its middle.

ee, The *Nymphæ*.

FF, The Lips of the *Pudendum*.

gg, Parts of the *Vagina* diſſected, and drawn from each other.

H, The *Internal* or wrinkled Tunick of the *Vagina*.

TAB. XXXIV.

The foreparts of the Genitals of a Woman taken out of the Body, and plac'd in their natural ſite from Regnerus de Graaf. *This Figure ſhews the Parts reverſt; that which here is ſaid to be of the Right ſide being of the Left, and* vice verſa.

AA, THE Trunk of the *Arteria Magna*.

BB, The Trunk of the *Vena Cava*.

C, The *right* Emulgent Vein.

D, The *left* Emulgent Vein.

E, The *left* Emulgent Artery.

F, The *right* Emulgent Artery.

HH, The *Ureters* cut off.

I, The *right* Spermatick Artery.

K, The *left* Spermatick Artery.

L, The *right* Spermatick Vein.

M, The *left* Spermatick Vein.

NN, *Arteriæ Iliacæ*.

OO, *Venæ Iliacæ*.

PP, The *internal* branches of the *Arteria Iliaca*.

QQ, The *external* branches of *Arteria Iliaca*.

RR, The *internal* branches of the *Vena Iliaca*.

SS, The *external* branches of the *Vena Iliaca*.

TT, The *Hypogaſtick* Arteries that go to the *Uterus* and *Vagina*.

VV, The *Hypogaſtrick* Veins that go along with the ſaid Arteries.

XX, The *branches* of the *Hypogaſtrick* Arteries that go to the Urinary Bladder.

YY, The *branches* of the *Hypogaſtrick* Veins that go to the Bladder.

ZZ, *Portions* of the *Vmbilical* Arteries.

a, The bottom of the *Vterus* cover'd with its common Tunick.

bb, The round Ligaments of the *Vterus* as they are joyn'd together in its bottom.

cc, The *Tubæ Fallopianæ* in their natural poſition.

dd, The *edges* of the Tubes.

ee, The *Foramina* of the Tubes.

ff, The Teſticles in their natural poſition.

g, A portion of the *Rectum.*

h, The neck of the Womb without its Tunick, that the Veſſels may be ſeen the better.

i, The forepart of the *Vagina* of the *Vterus* freed from the *Vrinary* Bladder.

k, The *Vrinary* Bladder contracted.

ll, The *Sanguineous* Veſſels running through the Bladder.

m, The *Muſculus Sphincter* of the neck of the Bladder.

n, The *Clitoris.*

oo, The *Nymphæ.*

p, The *Vrinary* paſſage.

qq, The *Lips* of the *Pudendum.*

r, The Orifice of the *Vagina.*

TAB. XXXV.

All from de Graaf.

The Bladder of Vrine and Uterus, *&c. of a Woman.*

FIG. I.

THE forepart of the *Vrethra* with part of the Bladder of the Urine open'd.

A, The Bladder of Urine.

C, The neck of the Bladder open'd.

D, The *Vrethra* open'd according to its length.

E, The Orifice of the *Vrethra*, and the paſſages of the *Lacunæ* into it.

FF, The *Lacunæ* going through the *Proſtatæ.*

FF, The *Lacunæ* taken out of the Glandulous Body of the *Proſtatæ*, and blown up.

GG, The internal ſubſtance of the *Proſtatæ*, or the Glandalous Body.

H, The ſides of the Bladder of Urine ſeparated from one another after the diviſion.

BB, The Ureters cut off.

NN, The Lips of the *pudendum.*

L, The Orifice of the *Vagina.*

MM, The carnous Fibres of the *Sphincter* cut off.

FIG.

FIG. II.

Shews the *Vagina* of the *Uterus* open'd on the backſide length-ways.

A, The wrinkled internal Membrane of the *Vagina.*

B, The internal *Oſculum uteri* bending down at the upper part of the *Vagina.*

C, The neck of the *Uterus.*

D, The bottom of the *Uterus.*

EE, The *Tubæ Fallopianæ,* or *Oviducts.*

FF, The internal rugous membrane of the Oviducts.

GG, Nerves and Blood Veſſels diſpers'd through the *Ligaments* that are like Bats Wings.

HH, The *Teſticles* or *Ovaria.*

II. The Ligaments of the *Teſticles,* commonly call'd the *vaſa deferentia.*

KK, Portions of the *broad* Ligaments.

LL, Small Nerves diſpers'd (as we ſometimes ſee) through the *Uterus.*

MM, The Portions of the round Ligaments that lie in the *Abdomen.*

NN, The Portions of the ſame without the *Abdomen.*

OO, The parts of the *Peritonæum* cleaving to the Ligaments while they are within the Cavity of the *Abdomen.*

PP, The under and thinner part of the *Vagina* next the *Rectum* cut thro' and drawn aſunder.

QQ, The thickneſs of the membranous ſubſtance that is in the lower part of the *Vagina.*

R, The Orifice of the Urinary paſſage.

SS, The *Foramina* of the *Lacunæ.*

T, The *Clitoris.*

V. Conſiderable Nerves that go on the outſide or back of the *Clitoris.*

FIG. III.

Shews the Cavity of the *Uterus.*

AA, The *Uterus* cut length ways.

BB, The bottom of the *Uterus* cut croſs, to ſee the paſſage of the *Fallopian Tube* in the Cavity of the *Uterus.*

C, The beginning of the left Tube as it is ordinarily ſtreightned.

DD, The proceſs of the Tube more and more dilated.

EE, The Ligaments of the Teſticles cut off.

FF, The round Ligaments of the *Uterus* hanging down.

G, The Cavity of the *Fundus Uteri.*

H, The Cavity of the *Cervix* and its fibrous ſubſtance.

II, The internal proper Membrane of the *Uterus.*

K, The mouth of the *Uterus.*

L, The ſtreightning of the neck of the Womb.

FIG. IV.

Shews the Teſticle or *Ovarium* of a Woman.

A, The Teſticle open'd length ways in the lower part.

BB, The *Ova* of different ſizes kept within the Membranous ſubſtance of the Teſticles.

CC, *Blood* Veſſels in the middle of the Teſticles, as they come in great Numbers, from its upper part to the Eggs.

DD, The Ligament of the Teſticles cut off, by which they are joyn'd to the *Uterus*.

FIG. V.

Shews the place that contains the *Eggs*, in the *Ovarium* of an Ewe, or female Sheep.

A, The glandulous ſubſtance of the *Globuli* open'd.

B, The place from whence the *Egg* was taken out.

C, The *Egg* taken out of it.

FIG. VI.

The Teſticle of a Rabbet, in which the *papillæ* of the *folliculi* are delineated as they appear the ſecond day after Coition.

FIG. VII.

Another Teſticle of the ſame Creature, in which the thickneſs and cavities of the *folliculi* appear the third day from Coition, in which the Eggs lay hid.

FIG. VIII.

Shews the Womb open'd by an Inciſion of the forepart.

AA, The parts of the *Uterus* cut a-croſs, and ſo order'd that its cavity and the thickneſs of its ſpongious ſides may be ſeen.

B, The Cavity of the bottom of the *Uterus*.

C, The Cavity of the neck of the *Uterus*.

D, The ſtreightneſs between the Cavities of the bottom and neck very conſpicuous.

E, The mouth of the *Uterus*.

F, The part of the *Vagina* cleaving to the mouth of the *Uterus*.

GG, Part of the Tubes.

HH, Probes inſerted by the Tubes into the bottom of the *Uterus*.

II, The proper Membrane of the *Uterus* covering its inward ſubſtance.

KK, The interior Membrane of the neck of the *Uterus* leſs ſpongious.

TAB. XXXVI.

Fig. 1. *from* De Graaf, *the reſt from* Hoboken *and* Bidloo.

FIG. I.

AN *Abortive* of three months with its ſecundines.

A, The *Fœtus*.

B, Its *Navel*.

CC, The inequalities or *knots* of its Navel-ſtring.

DD, Two parts of the Membrane call'd *Amnios* expanded.

EE, Part of the Membrane called *Chorion* expanded.

FF, Part of the *Amnios* and *Chorion* ſticking together.

G, Parts of *Allantois* ſeparated from the *Amnios* and laid bare.

HH, That Part of the *Allantois* or *Urinary* Membrane blowed up which lies under the *Amnios.*

I, The inſertion of the *Navel* ſtring into the *Placenta.*

KK, Part of the *Placenta.*

LL, Part of the *Placenta* ſeparated, that its Blood Veſſels may be ſeen.

MM, The hinder part of the *Chorion*, from, whence the branches of the veſſels of the *Placenta* go like the branches of Trees, before they inſinuate themſelves into the pores of the *Uterus.*

FIG. IX.

The ſurface of the *ſecundines* of a *Fœtus* next the *Uterus.*

AA, The *Placenta Uterina.*

BBBB, The *Chorion.*

CCCC, The *Amnios.*

D, A part of the *Navel* ſtring.

FIG. III.

The ſurface of the *ſecundines* next the *Fœtus.*

AAA, The internal ſurface of the *Placenta* next the *Fœtus.*

BBBB, The *Amnios.*

C, The *Chorion.*

D, The Urinary Membrane cut off.

EE, The Navel ſtring.

FF, The knots of its Veſſels.

G, That part of the Navel ſtring next the *Fœtus.*

H, A diſtribution of the Veſſels into the *Placenta.*

FIG. IV.

AAA, Parts of the *Navel* ſtring.

BB, The *Arteries* with their *knots.*

CCC, One of 'em open.

D, The *Umbilical* Vein.

FIG. V.

Shews the *Navel* ſtring diſſected tranſverſly, and view'd thro' a Microſcope.

AA, The *Navel* ſtring diſſected in the middle.

B, the *Umbilical* Vein.

CC, The two *Umbilical* Arteries.

dd, *Divers Ducts* containing the *ſuccus Nutritius.*

EE, The Fibres.

F, The *Urachus* between the two Arteries.

FIG. VI.

Another part of the *Navel*-ſtring in which its Veſſels being filled with Wax their turnings may be partly ſeen.

A, Part of the *Navel*-ſtring.

B, The turnings of both *Arteries* which have little knots on both ſides.

C, The Vein that goes with the *Arteries.*

TAB. XXXVII.

From Bidloo.

FIG. I.

THe *Papilla* and *Areola* of a Womans Breaſt expreſt by the aſſiſtance of a *Microſcope*.

A, The head or top of the *Nipple*.

B, Its Glandluous Membrane.

C, The mouths of the Milk Veſſels.

DD, The *Areola*.

E, Its rough Membrane.

FFF, Divers *Papillary* Protuberances from each of which a Hair proceeds.

GG, Some *Veſtigia* of the *Lactiferous* Tubes in their progreſs from the *Mamma* to the *Papilla*, A, B, C.

FIG. II.

The *Papilla* it ſelf with its *Milk*-veſſels *magnified*.

AA, The external Glandulous Membrane of the *Papilla* ſeparated from it.

BB, Divers Glands of the *Papilla* cleaving to this Membrane.

CC, The *Lactiferous Tubes* with ariſe from the extremities of the Arteries within the *Mamma*, and diſcharge their Contents at their Orifices in the top of the *Papilla*, C. Fig. 1.

DD, The Glands of the *Papilla*, whoſe ſecretory Ducts diſcharge themſelves into the *Lactiferous* Tubes.

FIG. III.

The back part of the *Areola* that was divided from the Breaſt.

AA, The Circumference of the *Areola*.

BB, The *Mammary* Glands.

CC, The *Lactiferous* Tubes in their way to the *Nipple*.

FIG. IV.

Shews a *Hair* delineated by a *Microſcope*.

AA, The *Hair* above the skin which ſeems to be compos'd of divers *horny Globular* Bodies.

B, Part of the *Cuticula* which adheres to the *Hair*.

C, The root of the *Hair* within the Skin.

ddd, The *Fibrillæ*, or branches which grow out of the *Hair*.

FIG. V.

A Woman's Breaſt diſſected.

AA, The *Skin* rais'd and pinn'd out.

B, The *Skin* partly remaining on it.

C, The *Nipple*, or *Papilla*.

DD, The *Areola*.

EE, The *Glands* of the *Breaſt*.

FF, The *Lactiferous* Tubes and *Blood* Veſſels in the interſtices of the *Glands*.

GG, The Adipoſe Ducts placed between the lactiferous Tubes:

HH, Part of the Pectoral Muſcle.

FIG. VI.

AA, The *Mamma* of a Man.

B, Its Skin.

C, The *Papilla.*

DD, The *Areola.*

FIG. VII.

AA, A Hair magnify'd by a Microſcope.

TAB. XXXVIII.

Fig. 1. *is* Blancard'*s* (*as he ſays*). 2. *from* Bidloo, *the reſt from Dr.* Willis.

FIG. I.

THE Delineation of the *Cuticula* by a Microſcope.

AAAA, The *Sweat Pores* as they appear by a Microſcope.

BBBB, The Furrows and Channels which are form'd by the Glands that lye under.

FIG. II.

The *Skin* view'd through a Microſcope.

aaa, The *Papillæ* compoſed of the four kinds of Veſſels.

bbb, *Capillaments* of *watery* Veſſels placed between the *Papillæ*, ſays *Bidloo.*

dd, The Veſſels of Sweat placed in the middle of three or four *Papillæ.*

ee. The *Hairs* ariſing at the ſides of the Pores of the *Sweat-Veſſels*, having colateral Branches.

FIG. III.

Shews the ordinary appearance of a *ſimple regular* Muſcle, in whoſe Belly the carnous Fibres being opened, and ſeparated from one another, the membranous *Fibrillæ* may be ſeen.

A, The right *Tendon.*

B, The left oppoſite *Tendon.*

C, The *fleſhy Belly*, whoſe Fibres being equal and parallel, lie between both Tendons at oblique but equal Angles.

D, The opening of the *carnous Fibres*, which being drawn from one another; the *membranous Fibrillæ* that paſs the croſs-way appear.

FIG. IV.

Shews a *ſimple Muſcle*, after the *Tendon* is cut off, and ſome part ſeparated from it, and cut in the middle that the *interior Series* of the *carnous Fibres*, and their joyning with the *Tendons*, may appear.

A A, The *right Tendon* placed above, both parts of which being divided, appear.

B, The *left oppoſite Tendon*, which being divided, the Fibres only are ſeen upon the edge, the reſt lying very much under the Fleſh.

C, Part of the *carnous Belly* divided and ſeparated, in which all the equal *carnous Fibres* proceed in the ſame oblique Order from one Tendon to the other.

D, Some *membranous Fibrillæ* that croſs the fleſhy ones very thick, ſcarce expreſs'd in this Figure.

FIG. V.

Shews a Muſcle not much compounded.

A, The *exterior compound Tendon* incloſing the Fleſh on both ſides, which being divided, little more than the edges of it are here ſeen.

B, The *interior compound Tendon* paſſing through the middle of the Fleſh, which receives the *carnous Fibres*, ſent from both ſides of the *exterior Tendon*.

C, The *firſt Belly* of the carnous Fibres, whoſe Fibres being all equal and parallel, lie between the ſides of the Tendons that are oppoſite, at oblique and equal Angles.

D, The *ſecond belly* of the fleſhy fibres, which being made after the ſame manner with the former, go the ſame way with them.

EE, Both the extremities of the *exterior compound tendon*.

F, The Extremity of the *internal compound tendon*.

FIG. VI.

Shews the *regular* compound Muſcle, divided in the middle and opened, ſo that the parts of both Bellies may be ſeen within ſide.

A, The *compound exterior Tendon* divided into four parts.

BB, Parts of one ſide of the divided Tendon, ſeparated from one another.

C, Parts of the other ſide of the Tendon, likewiſe divided and laid by each other, which lie very much under the fleſh.

DD, The Fleſh of the one Belly divided and ſeparated from the other.

EE, the Fleſh of the other Belly divided and laid by.

F, The *interior compound Tendon* paſſing through the middle of the fleſh.

GG, Parts of the ſame *Tendon* divided from one another, with the Fibres of that Belly of the Muſcle that joins with them.

TAB. XXXIX.

All from Bidloo.

FIG. I.

THE Muſcles of the Lips, and ſome of thoſe of the Lower Jaw, after the *Quadratus Genæ* is taken off.

N. B. That theſe, and moſt other Figures taken from Bidloo, *we ſhall follow the Deſcriptions given them by Mr.* Cowper. *See his Anatomy, Tab.* 12.

a, This formal appearance of circular Fibres, about the *Alæ Naſi* (ſays he) I ſuſpect to be fictitious, having never obſerv'd ſuch a diſpoſition of them in any Subject, after purpoſely examining this Part; yet the like Figure of theſe Fibres may be ſeen in *Placentinus* and others.

b, A Muſcle whoſe Poſition renders it capable of pulling up the *Ala Naſi*, whence its call'd *Elevator Alæ Naſi*, and by *Placentinus*, *Pyramidalis*, from its Figure; nor do we commonly find this Muſcle in Diſſection; the fleſhy Fibres of this Part, frequently taking the ſame courſe with thoſe of the *Orbicularis Palpebrarum*, do paſs by the *Ala Naſi*.

c, The *Muſculus elevator Labii ſuperioris proprius*.

n, The *Orbicularis Palpebrarum*. This is a thin fleſhy Muſcle, circularly environing the Eye-lids, to which it is inſerted not unlike the *Sphincter* Muſcle of other Parts, as of the Lips and Bladder of Urin: It acts in drawing the Eye-lids nearer each other, which we call ſhutting the Eye-lids. But if this Muſcle acts vigorouſly, it not only draws the Eye-lids cloſe together, but forces the Bulb of the Eye into the Orbit.

Note, n in this Fig. as in that of *Bidloo*, by miſtake is placed on the Temporal Muſcle.

o, The *Muſculus Maſſeter in ſitu*.

p, Part of the *Buccinator*, covered with Fat.

l, The Parotid Gland, part of which being cut away to ſhew the *Maſſeter*.

k, m, n, The Temporal Muſcle, k n its outſide, m its inſide next the Skull turn'd down.

Beſides theſe Letters of Reference, Mr. *Cowper* adds five more, which are not taken notice of, either by *Blancard* or *Bidloo*.

FIG. II.

Exhibits the Muſcles of the Lips, and ſome of thoſe of the Lower-Jaw.

a, b, c, The *Muſculus Buccinator*, freed from its Origin at the *Proceſſus Coronæ* of the Lower-Jaw, and left at its Inſertion at the angle of the Lips. Here we may obſerve, that in this Figure, as in the Life, the Fibres of this Muſcle run according to its length, contrary to the Deſcription *Bidloo* and others give of it. The *Ductus Salivalis* of the Parotid Gland, paſſes thro' this Muſcle into the Mouth.

d, The *Muſculus elevator Labiorum communis.*

e, The *Elevator Labii ſuperioris proprius*, and *Muſculus Dilatator Alæ naſi.*

f, The *Zygomaticus.*

g, The *Depreſſor Labiorum communis.*

h, The *Depreſſor Labii inferioris proprius.*

i, The *Conſtrictor*, or *Sphincter Labiorum.*

k, m, The *Temporalis.*

n, The *Proceſſus condyliformis* of the Lower-Jaw, which is in a great part laid bare.

To this Figure alſo divers other References are added by Mr. *Cowper.*

FIG. III.

Divers Muſcles of the Tongue, *Os Hyoides* and *Larynx*, as they appear in their proper Situation after the ſide of the Lower-Jaw is taken off.

aab, The Tongue pinn'd up.

c, The *Stylogloſſus.*

d, The *Ceratogloſſus*, by *Bidloo* miſtaken for *Baſiogloſſus.*

e, f, The *Geniogloſſus.*

g, The *Baſis* of the *Os Hyoides.*

h, Part of the *Fauces*, contiguous to the root of the Tongue which *Bidloo* and *Blancard* erroneouſly call the *Muſculus Ceratogloſſus.*

i, Part of the *Geniogloſſus*,

k, The *Sternohyoideus.*

l, Part of the *Coracohyoideus.*

Note, That l (according to the Original of *Bidloo*) is here placed on different Parts of this Figure, but the lowermoſt belongs to the laſt Reference.

m, The *Muſculus Stylohyoideus.*

n, The *Mylohyoideus*, left at its Inſertion to the *Os Hyoides.*

o, The *Geniohyoideus in ſitu.*

FIG. IV.

Divers Muſcles of the Lower Jaw and *Os Hyoides in ſitu*, after the Skin, with the *Muſculas Quadratus Colli*, are removed.

a, b, c, The *Muſculus Digaſtricus*; b, its fleſhy origin from the *Proceſſus Mammillaris*; c, its middle Tendon paſſing through the *Muſculus Stylohyoideus*, and an Annular Ligament faſtned to the *Hyois*, before it is implanted into the Lower-Jaw, dd.

dd, The under part of the Lower Jaw-bone next the Chin.

ee, The *Mylohyoideus.*

ff, The *Sternohyoidei.*

gg, Parts of the *Coracohyoidei.*

hh, Parts of the *Sternothyroidei.*

H, The *Maſtoideus.*

For the reſt of the Parts of this Figure, we muſt refer to Mr. *Cowper*'s Explication, the moſt ſignificant not being letter'd by *Bidloo* or *Blancard.*

FIG. V.

Divers Muſcles lying under thoſe expreſt in the preceeding Figure.

aa, The lower edge of the inferior Jaw-bone bared.

bb, Parts of the *Muſculi Sternohyoidei* hanging down from their Originals.

c, The *Coracohyoideus*.

d, Part of the *Muſculus Stylohyoideus*, at its Termination in the *Os Hyoides*.

e, The *Glandula ſublingualis* lying immediately under the *Muſculus Mylohyoideus*.

f, The *Geniohyoideus*.

gg, The Digaſtrick Muſcles of the Lower Jaw cut from their Inſertions.

hh, The *Muſculi Maſtoidei*, that of the right ſide remaining *in ſitu*; the left being cut off from its Original.

i, The Scutiformal Cartilage of the *Larynx*, which makes what is call'd the *Pomum Adami*.

k, The Wind-pipe.

ll, The *Glandulæ Thyroideæ*.

There are no leſs than ten conſiderable Parts not taken notice of in this Figure, either by *Bidloo* or *Blancard*; of which you may ſee an Account of in Mr. *Cowper*'s Explications, Tab. 15.

FIG. VI.

The Ramifications of the *Ductus Salivalis* injected with Wax, and freed from the Parotid Gland.

a, The Trunk cut off as it paſſes over the *Muſculus Maſſeter*.

b, c, d, e, f, The Ramifications of the Salival Duct freed from the Gland.

FIG. VII.

A, The *Muſculus Attollens Auriculam*.

B, CC, The *Retrahens Auriculam*.

aa, The External Margin of the outward Ear, call'd *Helix* and *Capreolus*.

BB, The *Anthelix Auriculæ*.

D, The *Tragus Auriculæ*, below which is the *Labus*.

DD, Below the upper D, ſhews part of the Parotid Gland.

EE, The Ramifications of its excretory Ducts.

G, The Trunk of its excretory or ſalival Duct cut off.

FIG. VIII.

Repreſents, according to *Bidloo*, the Salival Ducts freed from the inferior Maxillary Gland, expreſt *in ſitu* in *Fig*. 4. of this Table, but not letter'd nor taken any notice of by either of theſe Writers. This Figure, like ſome others publiſhed by *Bidloo*, was done from Invention, and is cenſur'd in Mr. *Cowper*'s Explications; however he adds *Bidloo*'s Account of it as follows.

A, The twigs of the Salival Ducts injected with Wax, and freed from the Glandules; B, the larger Branches; C, their common Duct; D, its Orifice encloſ'd with an edging; E, part of the Inveſting Membrane of the Mouth cut off. See *Fig*. 19. of Mr. *Cowper*'s Appendix.

TAB. XL.

From Bidloo.

FIG. I.

SHews divers Muſcles employ'd in the Motion of the Head, after the upper part of the *Circularis* is remov'd.

a, b, d, The *Muſculus Splenius in ſitu* on the left ſide.

e, The *Splenius* rais'd to ſhew.

f, g, h, The *Complexus.*

ii, The *Os Occipitis.*

FIG. II.

The Muſcles which appear under the former.

a, The *Rectus major poſticus*, hanging down.

b, The ſame *in ſitu.*

cc, The *Os Occipitis.*

e, The *Recti minoris* lying under the *majores.*

f, The *Obliquus inferior.*

g, The *Obliquus ſuperior.*

h, The ſame turn'd off from the other ſide.

i, The *Complexus* rais'd.

m, n, The *Spinales Colli.*

FIG. III.

Divers Muſcles of the Head and Neck, which appear in the fore-part, after the Lower-Jaw, Tongue, *Larynx*, *Aſpera Arteria* and *Gula* are removed.

aa, The *Muſculi Longi colli.*

bb, The three *Scaleni in ſitu.*

i, The *Maſtoideus in ſitu.*

l, The ſame rais'd from its Originals.

kk, Its ſeveral beginnings.

l, The *Flexores Capitis in ſitu.*

See the Original in *Bidloo.*

FIG. IV.

Divers Muſcles that appear in the ſuperior and fore-part of the Trunk.

a, The *Sternum.*

b, The *Muſculus ſubclavius.*

c, The Cartilaginous ending of the firſt Rib.

dd, The *Serratus major Anticus.*

ee, Its Indentations with the *Obliquus deſcendens.*

ff, The *Serratus major Anticus* rais'd.

g, The *Obliquus deſcendens.*

h, The *Pectoralis.*

i, The ſame rais'd.

k, The *Serratus minor Anticus* rais'd.

The reſt of the Muſcles expreſt in theſe Figures cannot be referred to for want of Characters placed on them in the Prints, all which are ſupplied by Mr. *Cowper* in his Explications.

TAB. XLI.

From Bidloo.

FIG. I.

aa, THE *Trapezius* or *Cucullaris* on both ſides.

bb, c, dd, f, g, The ſeveral Orders of its Fibres, as expreſſed in the Figure.

ii, The *latiſſimus dorſi*, or *Aniſcalptor in ſitu*.

ll, Part of the *obliquus deſcendens* on both ſides.

m, The *Infraſpinatus*.

h, n, The *baſis* of the *Scapula*.

oo, The Tendon of the *Latiſſimus dorſi*.

FIG. II.

a, The *Rhomboides in ſitu*.

b, c, Its Origin.

d, Its Termination.

e, The ſame ſeparated.

f, i, The *Serratus ſuperior poſticus*.

g, Part of the *levator ſcapula*.

h, Its ending.

k, The *Serratus poſticus inferior*.

l, The *Deltoides*.

m, The *Aniſcalptor*.

n, The *Sacrolumbus*.

o, The *longiſſimus dorſi*.

p, The *Semiſpinatus*.

q, r, The *Sacer*.

FIG. III.

a, The *Sacrolumbus*.

b, The *Longiſſimus dorſi*.

c, The *Semiſpinatus*.

FIG. IV.

a, The *Sacer*.

b, The *Quadratus Lumborum*.

c, The *Sacrolumbus*.

d, The *Longiſſimus dorſi*.

e, The *Semiſpinatus*.

f, The Ribs.

FIG. V.

aa, The *obliquus deſcendens* of the *Abdomen* out of its proper place.

bbb, Its firſt Connexion.

cc, Its ſecond and third from the Spines of the *Os Ilion*.

ee, The ending of its Fibres.

ff, Its Tendon cut off about the *linea Alba*.

g, Its membranous and tendinous inſertion into the *Os pubis*.

h, The Ribs that appear.

i, The *obliquus aſcendens*.

k, Its aſcending Fibres.

ll, m, n, The *Rectus* in its place.

oooo, Its tendinous Sections.

pp, The other *Rectus* remov'd out of its proper place.

qq, The *Muſculi Pyramidales.*

r, The *Tranſverſalis.*

ss, Its Tendon cut off.

ttt, The Inteſtines appearing under the *Peritoneum.*

vv, The Mammary and Hypogaſtrick Veins and Arteries.

FIG. VI.

Shews the Cavity of the *Abdomen*, after its *Viſcera* are taken out.

aaaa, The Muſcles of the *Abdomen* cut off.

bb, The Diaphragm, in its natural ſituation, as it appears next the *Abdomen.*

c, The *Foramen*, thro' which the *Vena cava* goes to the Heart.

d, The *Foramen*, thro' which the *Æſophagus* paſſes.

e, The Trunk of the great Artery cut off, paſſing thro' the *Foramen* of the Diaphragm.

f, Part of the upper Muſcle of the Diaphragm.

g, Part of the lower Muſcle of the Diaphragm.

h, Its two Tendons on the *Vertebræ* of the Loyns.

i, The *Vertebræ* of the Loyns.

kk, The *Pſoas*, or *Muſculus lumbaris.*

ll, The ſame, partly ſeparated from the *Vertebræ* and pin'd out.

m, The *Quadratus.*

n, The *Iliacus internus.*

o, The *Pectinæus*, which is call'd *lividus.*

pp, The *Triceps.*

TAB. XLII.

From Bidloo.

FIG. I.

aaa, THE Skin freed from the Muſcles.

b, The internal Tubercle of the *Os Humeri.*

c, The tendinous expanſion of the *Palmaris longus.*

d, The *Biceps.*

e, The *Pronator Radii Teres*, obſcurely expreſt.

f, g, The long Tendon of the *Palmaris.*

h, k, The tranſverſe Ligament of the *Carpus.*

i, The *Abductor pollicis.*

l, The Thumb.

m, n, o, p, The four Fingers.

FIG. II.

a, c, The *Muſculus Deltoides*, rais'd from its Original.

b, The *Clavicula.*

d, The *Pectoralis.*

e, The *Subſcapularis.*

f, The *Coracobrachialis.*

g, The *Biceps.*

h, The *Rotundus major.*

FIG. III.

a, The *Biceps* drawn off its ſubjacent Muſcles.
b, The *Brachiæus internus.*
c, d, e, The *Gemellus.*
f, The *Rotundus major.*
g, The *Supraſpinatus.*
xx, The *Deltoides.*

FIG. IV.

a, The *Perforatus.*
b, Its Tendons.
c, The *Perforans.*
ddd, Its four Tendons which paſs through the Fiſſures (ee) of thoſe of the former Muſcle.
ee, The Caſes in which they are all encloſed.
ff, The *Lumbricales.*

FIG. V.

a, The *Perforatus.*
b, The *Perforans.*
ccc, The *Lumbricales.*
dd, The *Interoſſei.*
e, The Fore-finger.
f, The Little Finger.
g, The Thumb.
h, The *Abductor Indicis.*
i, k, The *Abductor minimi digiti.*
l, *Flexor pollicis longus.*
p, m, o, *Flexor primi & ſecundi Oſſis pollicis.*
n, The *Abductor*, and part of the *Flexor ſecundi internodii Pollicis* rais'd together.

Thus far *Blancard*; Here is a Specimen of his Skill in *Anatomy*; his Maſter *Bidloo* could not go any farther with the Explication of this Figure than as above: But the Graver ſeeing other things expreſt in the Figure as remarkable as thoſe that were letter'd, thought he ſhould put Letters on the reſt too; which when he had done, *Blancard* could give no more account of, than *Bidloo* had done before him; which are as follows.

q, The *Biceps.*
r, The *Supinator Radii brevis.*
s, The *Pronator Radii teres.*
t, The *Pronator Radii quadratus*
v, The *Supinator Radii longus.*
x, The *Flexor Carpi Radialis.*
y, The Ligament between the *Ulna* and *Radius.*
z, The *Ulnaris Carpi Flexor.*

FIG. VI.

a, The Skin ſeparated and hanging by.
b, The Elbow or *Olecranon* by *Bidloo* and *Blancard* call'd the External *Apophyſis* of the *Os Humeri*, and
c, placed on the *Extenſor Carpi radialis*, which they call the Internal *Apophyſis* of the *Os Humeri.*
f, d, Is alſo placed on the ſame *Extenſor Carpi radialis.*
g, The *Extenſor digitorum communis.*
e, The *Extenſor Carpi Ulnaris.*
kk, i, Are placed confuſedly in this Figure.

FIG. VII.

a, The Fore Finger.
b, The Little Finger.
c, The Thumb.
d, The *Extenſor digitorum communis.*
ee, f, Its Tendons paſſing to the

the firſt and ſecond Bones of the Fingers here ſupported.

N. B. The *Radialis extenſor* is ſupported with a String.

FIG. VIII.

a, The *Radius*.
b, The *Ulna*.
c, The upper end of the *Radius*.
d, The Ligament joyning the *Ulna* and *Radius*.
e, The *Muſculus Ulnaris extenſor*.
f, i, The *Radialis extenſor*.
g, The *Supinator Radii brevis*.
hh, Part of the *Extenſor communis digitorum*.
k, The *Extenſor minimi digiti proprius*, expreſt three times bigger than it ought.
m, The *Carpus*.
nnnn, The Bones of the *Metacarpus*.
l, o, The *Extenſores primi, ſecundi & tertii Internodii pollicis*.
qq, Part of the *Extenſor communis digitorum*, together with the *Indicator*.

TAB. XLIII.

From Bidloo.

FIG. I.

a, THE *Glutæus major* rais'd.
b, The inequalities of its Fibres.
c, Its implantation into the *Trochanter*.
d, The *Glutæus medius*.
e. The *Trochanter major*, in which the *Glutæus medius* is implanted.
f, A Ligament between the *Os ſacrum* and *Iſchium*.
g, The knob of the *Iſchium*.

FIG. II.

a, The *Glutæus major* rais'd.
b, The *Medius* alſo rais'd.
c, The *Minor*.
d, g, i, The *Iliacus externus*, or *Pyriformis* rais'd.
e, The end of the *Os ſacrum*.
h, Part of the *Marſupialis*.

FIG. III.

b, The *Glutæus Medius*.
c, The *Minor*.
d, The *Iliacus externus*, or *Pyriformis* rais'd.
e, Part of the *Vaſtus externus*.
f, The *Marſupialis*.
g, Its *Marſupium*.
i, The head of the Thigh-bone
k, The *Os ilion*.
l, The *Os ſacrum*.
m, The *Os Iſchium*.

FIG. IV.

a, The *Sartorius longus.*
b, Its Origin from the Tubercle of the *Os Ilion.*
c, Its inſertion into the *Tibia.*
d, The *Gracilis.*
e, Its beginning from the *Os pubis.*
f, Its ending in the *Tibia.*
g, The *Rectus.*
h, The *Vaſtus internus.*
i, The *Vaſtus externus.*

FIG. V.

a, The *Muſculus membranoſus.*
b, Its broad Tendon, encloſing all the Muſcles of the Thigh.
c, The *Muſculus crureus.*
d, The *Sartorius longus* hanging down, with
e, The *Gracilis,* and
f, The *Rectus,* and
g, The *Vaſtus internus,* and
h, The *Vaſtus externus.*
i, The *Triceps.*
k, The *Pſoas,* or part of the *Muſculus Lumbaris.*

FIG. VI.

a, The *Biceps.*
b, Its two Heads.
c, Its ending.
d, The *Semimembranoſus.*
e, The *Seminervoſus.*
f, The *Glutæus magnus.*
g, The *Medius.*
h, The back part of the Thigh-bone.

FIG. VII.

a, The *Glutæus major.*
b, The *Biceps.*
c, The *Semimembranoſus.*
d, The *Seminervoſus.*
e, The Thigh-bone bared.
f, Parts of the Muſcles of the *Tibia.*

FIG. VIII.

aa, The Thigh-bone laid bare.
b, The *Muſculus crureus.*
c, The *Patella.*
d, Its incloſure.

TAB. XLIV.

From Bidloo.

FIG. I.

a, THE *Patella.*
b, The Tendons of the *Muſculi Peronei.*
c, The *Malleolus externus.*
d, The *Tibialis Anticus.*
e, The *Peronæus longus.*
f, The *Extenſor digitorum pedis longus.*
g, The Tendons on the top of the Foot.
h, Part of the Tendon of the *Extenſor pollicis.*
i, Part of the *Gaſtroconemius externus.*

FIG. II.

a, The ſuperior *Apophyſis* of the *Tibia.*

b, The upper *Appendix* of the *Fibula*.

c, The Body of the *Tibia*.

d, The Heel.

e, The *Muſculus Tibialis Anticus*.

f, The *Extenſor digitorum longus*.

g, The *Extenſor brevis*.

h, The *Extenſor pollicis pedis longus*.

i, *Peronæus longus in ſitu*.

k, The Skin of the Bottom of the Foot.

l, The *Stilus*, which ſupports the Tendons on the Foot.

FIG. III.

a, The *Tibialis Anticus*

c, The *Peronæus ſecundus*, or *Semiſibulæus*.

b, The *Peronæus primus* or *Fibulæus*.

d, The *Extenſor digitorum pedis longus*.

e, Its Tendons near their Inſertions.

f, *Extenſor digitorum pedis brevis*.

g, *Extenſor pollicis longus*.

m, *Extenſor brevis*.

} rais'd and left at their Inſertions.

h, The *Tibia*.

i, The *Fibula*.

k, The Bones of the *Tarſus*.

ll, The *Muſculi interoſſei*.

o, Part of the *Gaſtrocnemius internus*.

FIG. IV.

a, The upper part of the *Tibia*.

b, Its middle,

c, The Heel.

d, Part of the *Muſculus Poplitæus* at its inſertion.

ee, The *Gaſterocnemius externus*.

f, The Tendinous expanſion of the *Muſculus Plantaris*, freed from the bottom of the Foot and expanded; but here expreſt too large.

g, The *Muſculus Perforatus*, and Tendons of the *Perforans* on the bottom of the Foot.

h, The little Toe.

i, The great Toe.

FIG. V.

aa, Two Protuberances of the inferior *Appendix* of the Thigh-bone.

b, The upper part of the *Tibia*.

c, The *Muſculus Poplitæus*.

d, The fore-part of the Shin-bone.

ee, Parts of the *Gaſtrocnemius externus*.

f, The inſide of the *Gaſtrocnemius internus*.

g, The *Plantaris* left at its Original: This long ſlender Tendon here expreſt, is placed between the External and Internal *Gaſtrocnemii*.

h, A large Nerve in its way to the bottom of the Foot.

i, k, The *Flexor Pollicis longus in ſitu*.

FIG. VI.

a, The Knee.

b, The Shin-bone or *Tibia*.

c, The *Fibula*.

dd, The beginnings of the *Gaſtrocnemius externus* diſſected.

e, Its conjunction with the *Internus.*

ff, The *Muſculus Plantaris* diſſected.

g, The *Tibialis poſticus* diſſected

h, The *Perforans* diſſected.

i, The *Perforatus in ſitu.*

k, The *Flexor pollicis longus* diſſected.

FIG. VII.

aa, The Tendons of the *Perforans*, before they paſs the Fiſſures of thoſe of the *Perforatus.*

b, c, *Muſculus communis Lumbricalium pedis longus*, commonly call'd *Cornea Maſſa.*

d, e, f, Part of the *Flexor pollicis longus.*

g, Part of the *Abductor pollicis.*

h, The *Os Calcis.*

i, Part of the *Muſculus Perforans.*

k, The *Perforatus* raiſ'd.

FIG. VIII.

a, The *Muſculi Interoſſei.*

b, *Abductor minimi digiti.*

cc, Part of the *Abductor pollicis*, and *Flexor pollicis brevis.*

d, *Adductor pollicis.*

e, *Tranſverſalis pedis.*

f, The *Os Calcis.*

FIG. IX.

aa, The *Interoſſei.*

b, c, Divers Muſcles of the great Toe confuſedly diſpos'd.

d, *Abductor minimi digiti.*

TAB. XLV.

Fig. 1. *from* Bartholin, *the reſt from* Steno *and* Bourdon.

FIG. I.

Divers Muſcles that appear on the fore-part of the Body, after others are taken off.

A A, *Muſculi longi colli.*

B, *Muſculus ſcalenus.*

C, *Maſtoides.*

dd, The Bodies of the *Vertebræ* of the Neck.

D, *Cucullaris pars,*

ee, *Claviculæ.*

f, *Sternum,*

g, *Acromion ſcapulæ.*

E, *Muſculus ſubclavius.*

F, *Pectoralis.*

G, *Deltoides.*

H, *Biceps.*

I, *Perforatus* hanging down.

K, *Perforans.*

O, *Serratus minor anticus.*

PP, *Serratus major.*

QQ, Intercoſtal Muſcles.

RRR, *Brachiæus*, ſeen in both Arms under the *Biceps.*

SS, Part of the *Gemellus.*

TT, *Muſculus radii pronator rotundus.*

V, *Radii pronator quadratus.*

W, *Supinator radii longus.*

X, *Carpi flexor externus.*

Y, *Muſculus palmaris.*

Z, *Flexor carpi internus,*

h, *Radius.*
i, *Cubitus.*
K, The Ligament joining the *Radius* to the *Cubitus.*
aaa, *Muſculi lumbricales.*
b, *Flexor pollicis.*
cc, *Abductor pollicis.*

The following Characters are placed on the Parts that are below the Loins.

A, *Muſculus Pſoas*, or *lumbaris.*
B, *Iliacus internus.*
C, *Obturator internus.*
D, *Triceps.*
E, *Lividus.*
FF, *Muſculus rectus* in its proper place, but hanging on the left ſide from its end.
GG, *Vaſtus internus.*
H, *Vaſtus externus*, which being ſeparated, hangs down on the left ſide.
II, *Membranoſus*, or *Faſcia lata.*
K, *Crureus.*
L. *Faſcialis longus*, or *Sartorius.*
M, *Gracilis.*
N, *Tibiæus anticus.*
O, *Peronæus biceps.*
P, The Muſcle that extends the four Toes.
Q, *Extenſor Pollicis.*
R, *Gaſtrocnemius.*
rrr, *Muſculi interoſſei.*
S, The Ligament that goes acroſs the Foot, call'd *Anulare.*
T, *Tibia.*
V, *Fibula.*
X, *Patella.*

FIG. II.

The ſingle Fibre of a Muſcle.

AA, Its fleſhy Part.
BC, BC, Its two tendinous extremes making obtuſe Angles with its fleſhy Part.

FIG. III.

Many ſuch Fibres as repreſented in the preceeding Figure, which together frame an oblique angled Parallelogram.

A, B, The Orders of the fleſhy Fibres.
C, D, F, G, H, I, K, E, Their Tendinous Extremities.

FIG. IV.

The Fibres of a Muſcle, framing a ſimple Parallelopipede Figure.

A, B, C, D, E, F, G, The *Carnous* Part.
H, I, K, L, The *Tendinous* Part.

FIG. V.

The Diſpoſition of the Fibres of the *Muſculus Deltoides*, ſaid to be compos'd of 12 *ſimple* Muſcles, as repreſented by *Steno.*

AA, The upper part of the *Deltoides*, towards the top of the Shoulder.
aa, And the ſix ſuperior Tendons from which 12 Muſcles ariſe, and are fixt to the *Humerus.*
bbb, The 12 *Muſcles.*
cc, Their two *Tendons* fixed to the *Os Humeri.*

FIG. VI.

The Order of the Fibres of the *Muſculus biceps Humeri.*

FIG. VII.

The Order of the Fibres of the *Muſculus Semimembranoſus.*

TAB.

TAB. XLVI.

Fig. 1. *From* Tho. Bartholin. 2. *From* Caſper Bartholin.

FIG. I.

aa, PArts of the *Muſculi complexi* of the Head ſeen.
BB, *Splenii.*
CC, *Levator ſcapulæ* on both ſides.
D, *Trapezius*, or *Cucullaris* rais'd.
E, *Supraſpinatus.*
F, *Infraſpinatus.*
G, *Rotundus major.*
H, *Rotundus minor.*
I, *Rhomboides.*
K, The broadeſt Muſcle of the Back, call'd *Latiſſimus dorſi.*
L, *Serratus poſticus ſuperior.*
M, *Serratus poſticus inferior.*
N, The longeſt Muſcle of the Back, call'd *Longiſſimus dorſi.*
O, *Sacrolumbus.*
P, *Quadratus lumborum.*
Q, *Muſculus ſacer.*
R, S, *Gemellus*, or *Biceps externus.*
T, *Supinator Radii longus.*
V, *Extenſor carpi Radialis*, hanging down.
W, The other *Extenſor carpi.*
X, The two Extenſors of the Fingers.
The External *Apophyſis* of the Shoulder, at Z in *Bartholin*'s Figure.
b, *Muſculus Deltoides.*
The following Characters ſhow the Muſcles of the lower Limbs.
A, *Glutæus major* out of its proper place.
B, *Glutæus medius* in its proper place.
C, The Pyriformal Muſcle.
D, *Obturator internus*, or *Marſupialis.*
EE, *Biceps* bending the *Tibia.*
g, *Muſculus ſemimembranoſus.*
F, *Seminervoſus.*
h, *Gracilis.*
i, *Triceps* in the left ſide.
K, *Vaſtus externus.*
L, *Triceps* in the right ſide.
M, *Poplitæus.*
NN, *Gaſtrocnemii*, which in the Right Leg are in their proper ſituation, but hang down in the Left.
OO, *Soleus Muſculus.*
P, *Plantaris.*

FIG. II.

The Diaphragm reverſt in this Print.
AA, *Muſculus ſuperior.*
BB, *Inferior.*
C, The *Membranous Tendon* of the upper Muſcle.
ddd, The *Tendons* of the lower Muſcle.
E, The *Perforation* for the *Vena Cava.*
F, The *Diviſion* in which the deſcending Trunk of *Arteria magna* paſſes.
G, The *Perforation* in the middle of the lower Muſcle for the *Oeſophagus.*

TAB.

TAB. XLVII.

Fig. 1. *from* Tho. Bartholin, *the reſt from* Ant. Nucke.

FIG. I.

THE Muſcles which are placed by, or under thoſe expreſt in the firſt Figure of the preceeding Table.

aa, Which ſhould have been placed a little lower, as in the Original, to ſhew the *Muſculi Recti Minores.*

bb, *Recti majores.*

CC, *Obliqui ſuperiores.*

DD, *Obliqui inferiores.*

E, *Levator ſcapulæ.*

F, The *Scapula* bared.

G. *Rotundus major.*

HH, *Tranſverſales colli.*

II, The two *Spinati.*

K, *Sacrolumbus.*

L, *Longiſſimus dorſi.*

M, *Sacrolumbus* diſſected.

N, *Semiſpinatus.*

OO, *Muſculus ſacer.*

P, *Quadratus lumborum.*

Q, *Supinator Radii brevis.*

R, *Extenſor carpi radialis.*

S, *Extenſor carpi ulnaris.*

TT, *Extenſor digitorum communis.*

V, *Indicis extenſor.*

XX, *Extenſores pollicis.*

The following Characters are placed on the lower Limbs.

A, *Glutæus medius* hanging down.

B, *Glutæus minimus in ſitu.*

C, The ſame rais'd.

DD, *Pyriformis* on both ſides.

E, *Marſupialis.*

F, The ſame rais'd on the other ſide where the Letter

G, Its *Marſupium.*

H, *Obturator externus.*

I, K, *Quadragemini.*

LL, *Biceps.*

M, *Semimembranoſus.*

N, *Seminervoſus.*

O, *Gracilis.*

P, Part of the *Triceps.*

Q, *Vaſtus externus.*

R, *Tibiæus poſticus.*

S, *Flexor digitorum perforans*, rais'd and left at its two extremes.

T, *Flexor digitorum perforatus.*

V, *Flexor pollicis.*

See the Original for the following References.

z, *Carnea Maſſa in planta pedis.*

x, *Abductor minimi digiti.*

b, *Pollicis adductor.*

u, *Flexor pollicis brevis.*

s, The *long* Tendon of the *Flexor pollicis.*

FIG. II.

The *Salival* Ducts of a Dog.

A, The *Salival* Duct, diſcovered by *Nucke* in Dogs; as it ariſes from a Gland plac'd in the *Orbit* of the Eye, and empties it ſelf into the Mouth, G.

B, The *Salival* Duct coming from the *Parotid* Gland, and emptying it ſelf in the Mouth at F.

E, The *Parotid* Gland.
F, The inſide of the Cheek.
D, The outſide.

FIG. III.

The *Salival* Gland, taken out of the *Orbit* of the Eye, with the Eye it ſelf.

A, The Body of the Gland.
B, Its *Ductus*.
C, The Bulb of the Eye, near which the Gland is placed.

FIG. IV.

A, The ſame *Salival* Gland as in the preceeding Figure.
B, Its *Excretory Salival* Duct.
CCC, Its Ramifications on the Surface of the Gland.

FIG. V.

The *Artery* and *Salival* Duct of the *Parotid* Gland of a Dog.

A, The *Trunk* of an *Artery* ariſing from the *Carotid*.
bbb, Its *Branches*.
C, The *Ductus ſalivalis*.
ddd, Its *Branches*.

TAB. XLVIII.

From Keckringius.

FIG. I.

SHews a *Fœtus* of two Months old, and the chief beginnings of the *Oſſification* in it; which is more clearly ſhown in a Figure ſomewhat larger.

A, The whole Head, being cartilaginous.
b, Shews the rude beginning of the *Oſſification* of the *3d pair* of *Bones* of the *upper Jaw*.
B, The *lower Jaw*, being bony, divided in the middle.
CC, The two *Clavicles*, which of all the Bones are firſt framed.
dddd, The tops and bottoms of the *Ribs*, being *cartilaginous*, when the others are bony.
EE, The *Hand*, being *cartilaginous*, divided into five Orders of Fingers, in which the beginnings of the Oſſifications appear like ſmall Points.
FF, A *Cartilage* of the *Os innominatum*, in which the two points of the Oſſification of the Bone call'd *Ilion* appear.
GG, The greater *Focil*, without any mark of a Cartilage, or Bones of the leſſer *Focil*.
HH, The *Feet*, like the *Hands*, wholly *cartilaginous*.

FIG. II.

Shews a *Fœtus* of five Months old.

A, The *Fontanella*.
B, The *Suture* dividing the *Os frontis*.

CC, The *cartilaginous center* of the *Os frontis.*

D, The *diviſion* of the lower Jaw.

dd, The *Sockets* of the Teeth.

EE, Shews the *greater* Joynts to be *cartilaginous*, the *leſſer* appear in the Hands and Feet by their blackneſs.

F, The little Oſſifications of the *Sternum.*

GG, A *Cartilage* encompaſſing the *Os Ilion.*

HH, The Bone call'd *Ilion* ſeparated from the two other Bones of the *Os innominatum.*

ii, The *Os Pubis* ſeparated from the other two.

kk, The *Os coxendicis* ſeparated from the *Os Pubis* and *Ilion.*

LL, The great *Foramina* in the *Oſſa Pubis* and *Coxendicis.*

MM, The *cartilaginous Patella.*

NN, Bony Specks appearing in the great Toes, with the reſt of the Toes.

FIG. III.

Shews the *Os Spœnoides*, in a *Fœtus* of five Months old united.

A, The greater Cartilage about the *ſella equina.*

bb, The Holes thro' which the Optic Nerves paſs.

cccc, The Holes thro' which the Nerves have their *exit.*

FIG. IV.

Shews the three little Bones in the *Os Petroſum.*

A, *Os ſquamoſum.*

B, *Proceſſus Zygomaticus.*

C, *Membrana Tympani.*

D, The bony circle about the *Tympanum*,

eee, The three diſtinct little Bones of the *Os Petroſum.*

E, The reſt of the *Os Petroſum* cartilaginous.

FIG. V.

Shews the Organ of Hearing.

A, The *Malleus*, with its long cartilaginous Proceſs a, to which the Membrane of the *Tympanum* joyns.

B, The *Incus*, with its Proceſs b, likewiſe cartilaginous.

C, The *Stapes*, not yet in the form of an *Iſoſceles.*

FIG. VI.

The *Epiſtropheus*, or ſecond *vertebra* of the Neck.

AA, The two lateral bony Proceſſes of the ſecond *vertebra* of the Neck.

B, Its Body, now appearing bony.

C, The *Foramen* for the paſſage of the Spinal Marrow.

FIG. VII.

The *Atlas* or firſt *vertebra* of the Neck.

AA, The two lateral bony Proceſſes of the firſt *vertebra* of the Neck.

B, The fore-part, as yet cartilaginous.

C, The Perforation for the paſſage of the Spinal Marrow.

TAB.

TAB. XLIX.

The 1ſt and 4th from Bartholin, *the reſt from* Veſlingius.

FIG. I.

AA, THE *Coronal Suture.*

B, Part of the *Sagittal* Suture.

CC, The *ſquamous* Suture of the *Os Temporum.*

D, *Os Frontis.*

E, Its Proceſs towards the great *Canthus* of the Eye.

F, Its other Proceſs to the leſſer *Canthus* of the Eye.

G, Its Perforation, by which Nerves and Blood-veſſels paſs to the Frontal Muſcle.

H, The *Bregma.*

I, The Temple-bone.

K, Its *Appendix* call'd *Styloides.*

L, Its Proceſs call'd *Mammillaris.*

M, Its other Proceſs, which makes the *Os Zugale* or *Zygoma.*

N, The firſt Bone of the upper Jaw.

O, The Second.

P, Its Hole, thro' which paſſes the *Ductus Lachrymalis.*

Q, The fourth Bone of the upper Jaw.

R, The firſt proper Bones of the Noſe.

S, The *ſeptum* of the Noſtrils.

T, The lower Jaw.

V, A Hole in it, which is outwardly ſmall, but larger internally.

X, The *Proceſſus* of the lower Jaw, call'd *Corone.*

Y, Its other blunt Proceſs, call'd *Condylodes.*

Z, The fore-Teeth, call'd *Inciſores.*

bb, The *Canini.*

cc, *Dentes molares.*

FIG. II.

The *Baſis* of the Skull.

AA, The *Os Occipitis.*

aa, The Proceſſes of the *Os Occipitis* to which thoſe of the firſt *vertebra* of the Neck are joyn'd.

BB, Part of the Temple-bone.

CC, The *Mammiform* Proceſs.

DD, The *Styliform* Proceſs.

EE, The *Proceſſus Jugalis.*

F, The external Face of the *Os Cuneiforme*, according to *Veſlingius*; which is properly the fore-part of the *Os Occipitis.*

GH, GH, The *Proceſſus Pterygoides*, or *Aliformes.*

I, The *Septum Narium.*

KK, The ſixth Bone of the upper Jaw.

kk, Two Holes by which a Branch of the fifth pair of Nerves go to the Palate.

LL, Parts of the fourth Bones of the upper Jaw.

m, Shews the four *cutting* Teeth.

nn, The two *Dog* Teeth.

oo, The reſt of the Teeth, call'd the *Grinders.*

FIG. III.

The Letters are ſo confuſedly placed in this Copy, that we muſt refer you to the Original Figure of *Veſlingius*.

AA, The hollow of the *Os Occipitis* within the Skull, in which the *Cerebellum* is receiv'd.

B, The internal Face of the *Os Sphenoides*.

CC, *Os Ethmoides*.

D, The Cavity of the Bone of the Forehead above the Noſe

aa, The firſt hole of the *Os Sphenoides* or *Cuneiformis*.

αα, The ſecond hole in the ſame Bone.

bb, The third.

cc, The ſixth.

-|-, The ſeventh.

dd, The fifth Perforation of *Os Cuneiforme*.

ee, The firſt Perforation of the Temple-bone.

ff, The ſtony Proceſs of the Temple-bone.

gg, The third Perforation of the Temple-bone.

hh, The fourth and fifth Perforation of the *Os Occipitis*.

FIG. IV.

The top of the Skull.

A, The Coronal Suture.

B, The Sagittal.

CC, The Lambdoidal Suture.

D, The *Os Frontis*, or Forehead-bone.

EE, The *Oſſa Sincipitis*, or *Bregmatis*.

F, Part of the *Os Occipitis*.

FIG. V.

Shews the Back parts of all the *Vertebræ* of the Neck together.

FIG. VI.

A, The firſt *Vertebra* of the Neck, call'd *Atlas*.

aa, Shews the two *Sinus*'s that receive the *Occiput*.

bb, The tranſverſe Proceſſes; in which are *Foramina*, thro' which Blood-Veſſels paſs to the Head.

FIG. VII.

The ſecond *Vertebra* of the Neck.

a, Its Proceſs call'd *Dens*.

b, Its double *Spine*.

FIG. VIII.

Some *Vertebræ* of the Back view'd behind.

aa, Their tranſverſe Proceſſes

BB, Their Spinal Proceſſes.

CC, The Bodies of the *Vertebræ*.

FIG. IX.

A, The back parts of the upper, and B the lower *Vertebra* of the Loins.

CCC, Their tranſverſe Proceſſes.

DD, Their Oblique deſcending Proceſſes.

FIG. X.

One of the *Vertebræ* of the Loins view'd from behind.

a, The great hole for the Spinal Marrow.

bb, The tranſverſe Proceſſes.

cc, The oblique Proceſſes.

d, The ſharp Proceſs called the Spine.

FIG. XI.

The inſide of the *Os Sacrum*.

aaa, The holes for the Nerves.

b, The three Bones of the *Os coccygis*.

a, e, i, Shews the Head of the Thigh-bone, and

bb, A ſide view of the *Vertebræ* of the Loins of ſome *Quadrupede*.

TAB. L.

Fig. 1. *very ill copy'd after* Veſalius, *the reſt from* Veſlingius.

FIG. I.

SHews the *Skeleton* of a Man.

AA, The inſides of the *Scapulæ*.

BB, Both the *Clavicles*.

C, The *Shoulder*-bone, or the Bone of the Arm.

aa, The upper *Appendix*, or head of the *Os Humeri*.

b, Its external *Tubercle*.

c, The internal *Tubercle* of the *Os Humeri*.

DD, *Radius*.

EE, *Ulna*.

FF, The eight Bones of the *Carpus*.

GG, The *Thumb*, compos'd of three Bones.

HH, The *Metacarpus*, produced of four Bones.

II. The four Fingers, each conſiſting of three Bones.

KK, The *Thigh*-bones.

LL, *Patella*, or the Knee-pan.

dd, The *head* of the *Thigh*-bone, or *Appendix ſuperior*,

ee, The *neck* of the *Thigh*-bone

ff, *Trochanter major*.

gg, *Trochanter minor*.

hh, The *Appendix*, or lower head of the Thigh.

MM, *Tibia*.

NN, *Fibula*.

ii, *Malleolus externus*.

KK, *Internus*.

OO, The ſeven Bones of the *Tarſus*.

PP, The five Bones of the *Metatarſus*.

kkkk, The Bones of the *Fingers*; of which three compoſe the Thumb, and as many each Finger.

FIG. II.

A, *Clavicula*.

a, The little head of the *Clavicle*, which is receiv'd in a ſhallow *Sinus* on the top of the *Sternum*.

b, The end of the *Clavicle*, by which it is join'd to the Spinal Proceſs of the *Scapula*.

FIG

FIG. III.

B, *Scapula*, or Shoulder-blade.
c, The *ſhort* Proceſs of the *Scapula* receiving the Shoulder-bone.
d, The *Proceſs* of the *Scapula*, call'd *Coracoides*, partly ſeen.
e, The Spinal Proceſs of the *Scapula*.
f, The *upper* Angle.
g, The *lower* Angle.
hh, The *Baſis* of the *Scapula*.

FIG. IV.

C, The *back* part of the *Os Humeri*.
D, The *upper* head of the ſame.
E, Its *lower* head.
g, The *Proceſs* of the *Ulna*, commonly call'd the *Elbow*.
H, The *Ulna*.
L, The *Radius*.

FIG. V.

The *eight* Bones of the *Carpus*.

FIG. VI.

A, The inſide of the *Os Ilion*.
B, Its *Acetabulum*, which receives the head of the *Thigh*-bone.
C, *Os Iſchii*.
D, *Os Pubis*.

FIG. VII.

C, d, The *back*-part of the *Thigh*-bone.
a, Its *head*, or upper *Appendix*.
b, *Trochanter major*.
c, *Linea aſpera*.
G, *Trochanter minor*.
ee, The heads of the lower *Appendix*.
f, Part of the *Patella*.

FIG. VIII.

D, The *Tibia* view'd behind.
G, *Malleolus internus*.
E, *Fibula*.
g, *Malleolus internus*.
h, *Malleolus externus*.
ii, The *Appendix* of the *Tibia*.

FIG. IX.

A, *Aſtragalus*.
B, The *Os Calcis*.
c, *Os Cymbiforme*.
D, *Os Cubiforme*.
EEE, The three *Oſſa Cuneiformia*.

FIG. X.

Shews a piece of the Nail, view'd with a Microſcope; in which many little Furrows are ſeen.

TAB.

TAB. LI.

SHEWS ſome Anatomical Inſtruments; but eſpecially the *Syringe*, by which Water is eaſily injected.

AA, A Braſs *Syringe*, holding 20 Ounces of Water.

B, The Peſtle, or *Embolum.*

CCC, A flexible leathern-Pipe, very uſeful in Diſſection. *Theſe Letters of Reference are wanting in the Figure.*

D, The Mouth of the leathern-Pipe; compaſſed about with a braſs Tunnel, to which the Pipe I.I.I.S and others may be fitted.

E, N, Two Cocks by which the Liquor goes in or out. For when the Peſtel B is in the Syringe, and the Cock E is ſtopt and N open, the Liquor will eaſily paſs into the Syringe by the Pipe GG: If the Peſtel B be drawn out, and the Cock N ſtopt and E open, the Liquor contain'd in AA, E, is brought out at D.

F, A braſs-Pipe join'd to AA that the Water GG may be drawn into AA.

GG, A leathern-Pipe join'd cloſe to F; thro' which any Liquor it is put into aſcends into the Syringe AA.

H, Its braſs Mouth.

III, A ſilver or braſs-Pipe, to be put upon the Mouth D, that the Liquor may go from CC, through III, into the Part that it is to be ſent to.

S, The Mouth of the Pipe made very ſmall, that it may paſs into the Lacteal Veſſels and Chyliferous Ducts.

L, The Mouth of the Pipe, to be faſtned to the Mouth D; which skrews, but with much trouble.

MM, Two Loops by which the Syringe is faſtned to the Table, thro' whoſe holes a Nail is driven to make it immovable.

O, A little ivory or wooden-hafted Knife, having two edges, to ſeparate the Skin and Muſcles

P, A proper Knife to cut any Part.

Q, A crooked Knife, with which the little Veſſels and Coats of the Eye are diſſected.

RR, A Blow-Pipe.

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